JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

VOL. XXVI DECEMBER, 1937 No. 12

CHARLES HERBERT LAWALL.

Dr. Charles Herbert LaWall, one of the outstanding scholars, teachers and authors, in American Pharmacy, and Dean of Pharmacy at the Philadelphia College of Pharmacy and Science, died of pneumonia at the Jewish Hospital, Philadelphia, on Tuesday, December 7, 1937, after an illness of two weeks.

Dr. LaWall was born in Allentown, Pa., May 7, 1871, graduated from the College Preparatory State Normal School in 1888, served his apprenticeship in the Moyer Brothers' Pharmacy in Bloomsburg, and graduated from the Philadelphia College of Pharmacy in 1893. In 1905 he received the degree of Master of Pharmacy, in course, his advanced studies including work on vegetable coloring matter; in 1919 the honorary degree of Doctor of Pharmacy, from the University of Pittsburgh; and in 1920 the honorary degree of Doctor of Science from Susquehanna University.

His long service as a teacher began in 1900, when he was made Instructor in Theory and Practice of Pharmacy in his alma mater; in 1906, he became Associate Professor and succeeded Dr. Remington as Professor and as Dean, on his death in 1918.

For one year after graduation, Dr. LaWall was employed as a retail pharmacist and then in the chemical laboratory of Smith, Kline & French, Inc., until 1903, when he became associated with the late Dr. Henry Leffman in his analytical laboratory. After Dr. Leffman's retirement, Dr. LaWall continued the laboratory and was later joined by Dr. Joseph W. E. Harrisson.

Since 1904, Dr. LaWall has served as chemist for the Bureau of Foods, Pennsylvania Department of Agriculture; from 1905–1912 and since 1914, as chemist for the Pennsylvania Board of Pharmacy; from 1906–1918, as chemist to the Pennsylvania Department of Health; from 1907–1912, as Food Inspection Chemist to the U. S. Department of Agriculture. During this time he examined thou-

sands of samples of foods and drugs and appeared in court in hundreds of cases, establishing a national reputation as an authority in this field.

His services to the United States Pharmacopœia and the National Formulary were outstanding, as a member of the Revision Committee of the former from 1910 to his death and of the latter from 1906 to 1929. He served as secretary of the U. S. P. Committee of Revision and succeeded Dr. Remington as chairman, serving from 1918 to 1920.

He became associate editor of the United States Dispensatory, 20th edition, in 1909, and was co-author with Dr. Horatio C. Wood of the 21st and 22nd editions; with Dr. E. Fullerton Cook, he was co-author of the 7th and 8th editions of Remington's Practice of Pharmacy; and was co-author of Leffman and LaWall's Organic Chemistry, 1905. Probably his best known contribution as an author is "Four Thousand Years of Pharmacy," which is looked upon by pharmacists and laymen as a standard reference work on the history of pharmacy, and which reflected his beloved hobby of pharmaceutical history. He was the contributor of a great many papers and articles.

Dr. LaWall was a strong and earnest supporter of pharmaceutical organizations. He was president of the Pennsylvania Pharmaceutical Association in 1911 and of the American Association of Colleges of Pharmacy in 1923, after serving both organizations in various capacities. He became a member of the AMERICAN PHARMACEUTICAL ASSOCIATION in 1896 and a Life Member in 1930. From 1907 to 1909, he was secretary of the Section on Education and Legislation and chairman in 1910; secretary of the Scientific Section in 1911; vice-president in 1915; president in 1918, presiding at the New York meeting in 1919; vice-chairman of the Council in 1919 and from 1926 to 1934; chairman of the Council in 1920; and was a member on many committees. An important service was as chairman of a special committee to revise the Code of Ethics, which led to the adoption of the revised Code in 1922.

During the World War, Dr. LaWall was a member of the Auxiliary Committee on drugs and medicines of the War Industries Board; in 1931, was appointed representative of the United States on the League of Nations' International Committee for Assaying Opium; and in 1927, received the Remington Medal for his outstanding contributions to Pharmacy.

He was a fellow in the American Association for the Advancement of Science and in the Royal Society of Arts; a member of the American Chemical Society, American Medical Association, Society of Public Analysts (England), Franklin Institute, Philadelphia Academy of National Sciences and other professional and scientific organizations; and a past-master of Corinthian Lodge No. 368 F. and A. M., Philadelphia.

Dr. LaWall is survived by his wife, Mrs. Millicent Renshaw LaWall, and by a brother, Harold J. LaWall of Philadelphia. Mrs. LaWall is a graduate of the Philadelphia College of Pharmacy and a noted pharmacist, and has collaborated with her husband in many of his activities.

EDITORIAL

E. G. EBERLE, EDITOR 2215 Constitution Ave., WASHINGTON, D. C.

FOOD AND DRUG LEGISLATION.

THE FOLLOWING resolutions adopted unanimously at the Dallas (1936) and the New York (1937) meetings, respectively, concisely express the position of the ASSOCIATION with reference to this legislation.

"*Resolved*, that the AMERICAN PHARMACEUTICAL ASSOCIATION restates its profound conviction that the present Federal Food and Drugs Act is too limited in its scope to afford the public necessary protection in the matter of foods, drugs and cosmetics and that the ASSOCIATION urges the prompt enactment of legislation substantially the same as Senate Bill No. 5 as it was passed by the Senate in 1935;

"*Resolved further*, that the ASSOCIATION strongly opposes any provision in the proposed legislation which will lessen enforcement efficiency; and

"*Resolved further*, that additional delay in the enactment of food, drug and cosmetic legislation is unjustifiable and should be looked upon as a flagrant disregard of the public welfare."

"*Resolved*, that the ASSOCIATION express its profound dissatisfaction with the failure of Congress to enact food, drug and cosmetic legislation based upon a sound understanding of public health and designed to give the public adequate and immediate protection against adulteration of drugs, foods and cosmetics, and against all forms of misbranding and misstatement in labels and all forms of advertising."

After the lengthy study and full discussion of the subject during the last four years, there should be no real difficulty in deciding on the necessary and important provisions of the bill and in arriving at agreements with respect to them, between the various interests affected. Less important provisions should not be permitted to delay the legislation but should be deferred for such consideration at a later date as they deserve. Furthermore, it is practically impossible to compile a completely satisfactory bill; any measure adopted will probably have to be amended in the light of the experience gained in its enforcement.

This is not an approval of the hasty or ill-considered legislation. It is a plea for the adoption of improved food and drug legislation by the Congress at the coming session and an appeal to every national, state and local pharmaceutical association to place its influence squarely back of such action.

To say the least, S. 5 and Committee Print 3 provide the basis for satisfactory legislation at the coming session of the Congress.—E. F. K.

THE "ELIXIR OF SULFANILAMIDE" EXPERIENCE.

SO MUCH publicity has been given to the tragedy which followed the manufacture, distribution and use of this product and to the report with respect to it which the U. S. Department of Agriculture submitted to the Congress on November 26, 1937, that it is unnecessary to here review the former or to quote the latter. Every one joins in heart-felt sympathy to those who were in any way injured and in thanks and commendation to those who acted so promptly and so effectively to prevent greater harm.

It is important to place the responsibility for the tragedy and to punish those who are found to deserve it. It is much more important to take all possible steps to prevent a recurrence of such a tragedy by placing the necessary safeguards around the preparation, distribution and use of drugs and medicines.

In the report referred to above, it is recommended that in order "to protect the public from drugs which, like the elixir, are dangerous because of their inherent toxicity," legislation be enacted to provide at least the following:

1. License control of new drugs to insure that they will not be generally distributed until experimental and clinical tests have shown them to be safe for use. The definition of what constitutes a new drug should include (*a*) substances which have not been used sufficiently as drugs to become generally recognized as safe, (*b*) combinations of well-known drug substances where such combinations have not become generally recognized as safe, and (*c*) well-known drug substances and drug combinations bearing label directions for higher dosage or more frequent dosage or for longer duration of use than has become generally recognized as safe.

Exemption should be made for new drugs distributed to competent investigators for experimental work. A board of experts should be provided who will advise the Secretary of Agriculture on the safety of new drugs.

2. Prohibition of drugs which are dangerous to health when administered in accordance with the manufacturer's directions for use.

3. Requirement that drug labels bear appropriate directions for use and warnings against probable misuse.

4. Prohibition of secret remedies by requiring that labels disclose fully the composition of drugs.

With the purpose of the recommended legislation, this ASSOCIATION is in complete accord. To provide the control that is required without imposing a burden which even the Federal government will find it difficult to discharge, will require careful consideration and the profession and industry should contribute every possible assistance to the proper solution of this problem.

In response to these recommendations Senator Copeland introduced S. 3073 in the Senate on December 1, 1937, and it was referred to the Committee on Commerce. It provides "That (*a*) in order to safeguard the public health against the distribution of drugs which have not become generally recognized as safe for use, no person shall introduce or deliver for introduction into interstate commerce any drug composed, in whole or in part, of any substance or combination of substances, which substance or combination is not generally recognized as safe for use in the dosage and with the frequency and duration prescribed, recommended or suggested in the labeling thereof, unless the packer of such drug holds a notice of a finding by the Secretary that such drug is not unsafe for use."

The other sections provide for the enforcement of the legislation but do not include a penalty.

It is to be hoped that hearings on the bill will be held at an early date and that adequate legislation will be enacted during the coming session of the Congress.—E. F. K.

SCIENTIFIC SECTION

BOARD OF REVIEW OF PAPERS.—*Chairman*, F. E. Bibbins; H. M. Burlage, W. G. Crockett, E. V. Lynn, C. O. Lee, L. W. Rising, L. W. Rowe, Heber W. Youngken, Ralph E. Terry, Carl J. Klemme.

SOLUBILITY AND HYDROGEN-ION CONCENTRATION OF QUININE SALTS.*

PART I. EFFECT OF THE QUINOLINE AND QUINUCLIDINE NITROGENS.

FREDERICK F. JOHNSON.[1,2]

This work was undertaken with the hope of obtaining more fundamental information concerning the dissociation of free acid from an alkaloidal salt. The principles shown and verified in this paper will be used in an attempt to prepare a series of more soluble and less acid quinine salts.

Since there were no data in the literature concerning the change in acidity of quinine dihydrochloride during sterilization and storage, it was decided to observe these changes while the work was in progress. Solutions were prepared of strengths equivalent to those commonly used for injection purposes, namely, 3.25%, 10%, 25% and 50%. The p_H was determined before and after sterilization in soft glass ampuls for 30 minutes at 15 lbs. The p_H values were determined with quinhydrone —0.1 normal calomel electrodes, precipitation occurring when a saturated salt bridge was used. These ampuls were then stored in the dark at room temperature.

Strength.	p_H.	p_H after Sterilization.	p_H—36 Days' Storage.	p_H—2 Years' Storage.
3.25%	2.59	2.61	2.62	2.66
10.0 %	2.14	2.14	2.16	2.22
25.0 %	1.68	1.67	1.71	1.84
50.0 %	1.26	1.26	1.29	1.44

From this data it is clear that the reaction remains constant during sterilization in soft glass, but becomes less acid during prolonged storage. No precipitation occurred.

The data concerning the production of acidity in quinine salts should be preceded by a review of the very meager literature on this subject. The most acceptable measurements of the dissociation constants of quinine are those of Kolthoff (1). The results at 15° C. were: $K_1 = 1.1 \times 10^{-6}$ and $K_2 = 2.0 \times 10^{-10}$. Kolthoff also determined the K of quinoline to be 3.2×10^{-10}. Dietzel and Söllner (2) assumed the dissociation of acid from the nitrogens to be due to an ionization of the nitrogens, the increasing ionization of the nitrogens being due to an increased hydrogen-ion concentration and proportional to the increase in optical rotation. Arnall (3) approached this dissociation from a different standpoint, measuring the amount of HCl produced by hydrolysis of the monohydrochloride by the acceleration of the rate of inversion of a sucrose solution. The value obtained for quinoline hydrochloride was twenty times greater than the corresponding value for quinine hydrochloride.

There is no relation between the dissociation of the alkaloid and the hydrogen-ion concentration of its salts. By calculation from the dissociation constants,

* Scientific Section, A. PH. A., New York meeting, 1937.

[1] Assistant State Chemist, Seattle, Washington.

[2] Univ. of Washington, College of Pharmacy, Dept. of Pharmaceutical Chemistry.

$[OH_1^-]$ should be 26 times greater than $[OH_2^-]$. However, $[H^+]$ of B.2HCl is 2800 times greater than of B.HCl. Also no proportion exists between the difference in dissociation constants of the alkaloid and the difference in acidity of the two salts. Further measurements indicated that this discrepancy decreases somewhat as concentration decreases.

It was then attempted to formulate the degree of dissociation of the alkaloidal salt. This cannot be obtained accurately unless the $[OH^-]$ produced by the dissociation of the hydrolyzed base is considered. Mayeda (4) previously had derived the following expression:

$\gamma_b = \dfrac{K_w}{K_w + K_b.10^{-p_H}}$ where γ_b = the degree of hydrolysis of an alkaloid after being freed by dissociation of the salt. That is, (1) $\gamma_b = \dfrac{[BOH]}{[C]}$. In his derivation, Mayeda assumed complete dissociation of the salt.

Considering the assumption too great for this purpose, the derivation was repeated while considering the dissociation represented by $BA \rightleftarrows [B^+] + [A^-]$. This derivation has been omitted to conserve space as it is similar in many respects to the formulation of Mayeda (4). The final expression obtained is

$$\gamma_b = \frac{K_w.10^{-p_H}}{C(K_w + K_b.10^{-p_H})} \tag{2}$$

This equation represents the degree of hydrolysis of an alkaloid as a function of hydrogen-ion concentration and the total salt concentration. γ_b does not vary inversely with C because the hydrogen-ion concentration increases with C.

With an expression available for γ_b, the degree of liberation of free acid from an alkaloidal salt can be obtained from the hydrogen-ion concentration even in weakly acid solutions. Consider the dissociation of an alkaloidal salt.

$$BA \rightleftarrows [B^+] + [A^-]$$

Let γ_a = the degree of dissociation into free acid.

$$\gamma_a = \frac{[A^-]}{[C]}$$

Assuming complete dissociation of the liberated acid, and accounting for the hydroxyl-ion concentration produced by the hydrolyzed base,

$$[A^-] = [H^+] + \frac{K_b[BOH]}{[B^+]}$$

Equating [BOH] and $[B^+]$ in terms of γ_b,

$$[A^-] = [H^+] + \frac{K_b[C]\gamma_b}{[C](1 - \gamma_b) - [C] + [H^+]}$$

Substituting the value of γ_b from Equation 2 and simplifying gives

$$[A^-] = [H^+] + \frac{K_bK_w}{2K_w + K_b.10^{-p_H}}$$

$$\text{from which } T_a = \frac{10^{-p_H} + \dfrac{K_bK_w}{2K_w + K_b.10^{-p_H}}}{C} \tag{3}$$

In order to calculate the degree of dissociation (γ_a) of the alkaloidal salt quinine hydrochloride as a function of the concentration, it was necessary to determine the p_H values used in Equation 3, especially at low concentrations. When the p_H was plotted against concentration of quinine hydrochloride, a very distorted curve was obtained due to the effect of the atmospheric CO_2 as concentration decreased. Pure water of p_H 6.90 was prepared and the concentration: p_H curve was repeated using this water.

The method was as follows. Definite weights of anhydrous quinine hydrochloride were placed in weighed 700-cc. tin containers, each provided with a two-holed rubber stopper admitting either a 10-cc. or a 100-cc. pipette and a tube branching into two $Ba(OH)_2$ traps, one through which air could be removed and one through which air could be entered. Water was distilled four times; before the fourth distillation the water was alkalinized with KOH, the tin receiver was connected through the pipette with the condenser and the entire apparatus was evacuated through the $Ba(OH)_2$ trap. Solutions were removed and placed in color comparison tubes by being sucked into the evacuated pipette and forced with CO_2-free air into the evacuated comparison tubes containing the proper amounts of bromothymol blue. The two solutions of lowest concentration were prepared from the 0.001 molar solution by sucking the solution into an evacuated pipette and making up the volume by distillation as before. The p_H of the three solutions of greatest concentration could not be determined colorimetrically as slight precipitation of the dye occurred. The CO_2 effect being negligible at this concentration, the p_H values were determined with a quinhydrone electrode using a tenth-normal instead of a saturated salt bridge.

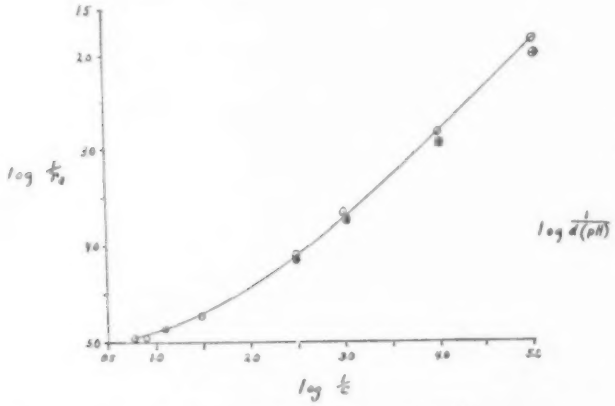


Fig. 1. — Concentration and γ_a of Quinine HCl
● represents values obtained by disregarding hydrolysis of base.

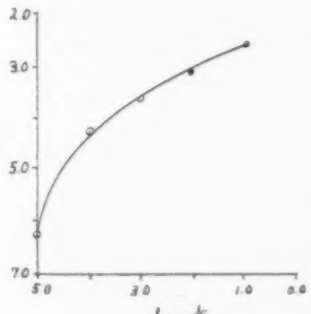


Fig 2

TABLE I.

Log $\frac{1}{C}$	p_H.	Log $\frac{1}{\gamma_a}$
0.79	5.77	4.98
0.85	5.82	4.98
0.90	5.87	4.97
1.10	6.00	4.89
1.50	6.23	4.71
2.00	6.45	4.43
2.50	6.62	4.09
3.00	6.74	3.68
4.00	6.90	2.80
5.00	6.95	1.83

In Table I are shown the p_H values as determined and the values for γ_a as calculated and compared with the concentrations. The function is plotted in Fig. 1 and shows the following to be true: (*a*) The degree of dissociation is independent of the concentration in ordinary dilutions. (*b*) The degree of dissociation increases sharply below a concentration of about 0.08 molar and becomes inversely proportional to the concentration. (*c*) The hydrolysis and dissociation of the alkaloid has a negligible effect on the apparent dissociation of the salt.

The difference in p_H between the two hydrochlorides of quinine is plotted in Fig. 2 as a function of concentration.

Dietzel and Söllner (2) assumed that the first equivalent of acid adds to the quinuclidine nitrogen of quinine because of the proximity of the hydroxyl group. A comparison of γ_b and γ_a of the nitrogens of quinine and the nitrogen of quinoline should definitely verify this assumption. For this purpose quinoline was carefully purified in the form of the sulfate and then converted to the hydrochloride and free base for subsequent measurements. The dissociation constant was determined on the free base in water of p_H 6.84 with a glass electrode. At 20° C., p_H = 8.87. $K_b = \frac{[OH^-]^2}{C} = 3.3 \times 10^{-10}$ agreeing with the second dissociation constant of quinine which is 3.3×10^{-10} at 15° C.

p_H 0.1 molar quinoline.HCl at 20° C. = 2.91
p_H 0.1 molar quinine.2HCl at 20° C. = 2.82
p_H 0.1 molar quinine.HCl at 20° C. = 5.87

From these the values for γ were calculated.

Quinine.HCl	$\gamma_b = 10^{-6.45}$	for quinuclidine nitrogen
Quinine.2HCl	$\gamma_b = 10^{-3.63}$	for quinoline nitrogen
Quinoline.HCL	$\gamma_b = 10^{-3.62}$	
Quinine.HCl	$\gamma_a = 10^{-4.93}$	for quinuclidine nitrogen
Quinine.2HCl	$\gamma_a = 10^{-1.32}$	for quinoline nitrogen
Quinoline.HCl	$\gamma_a = 10^{-1.91}$	

It is evident that K_1 is due to the quinuclidine hydrolysis and K_2 to the quinoline hydrolysis. The first equivalent of acid adds to the quinuclidine nitrogen and the second to the quinoline nitrogen. The infallibility of this was further verified by comparing values of γ for the quinine formates, acetates and lactates.

SUMMARY.

1. The reaction of quinine dihydrochloride remains constant during sterilization but becomes considerably less acid without precipitation during storage for two years in soft glass ampuls.

2. Expressions were derived for (*a*) the degree of hydrolysis of an alkaloid after being freed by dissociation of a salt, (*b*) the degree of dissociation of an alkaloidal salt into free acid.

3. The statement was verified that in quinine the first equivalent of acid adds to the quinuclidine nitrogen and the second equivalent adds to the quinoline nitrogen. The latter is responsible for the large solubility and large acidity.

REFERENCES.

(1) Kolthoff, I. M., *Biochem. Z.*, 162, 289 (1925).
(2) Dietzel, R., and Söllner, K., *Arch. Pharm. u. Ber. deut. pharm. Ges.*, 268, 629 (1930).
(3) Arnall, F., *J. Chem. Soc.*, 117, 835 (1920).
(4) Mayeda, S., *Biochem. Z.*, 197, 410 (1928).

SOLUBILITY AND HYDROGEN-ION CONCENTRATION OF QUININE SALTS.*

PART II. A NEW SERIES OF DOUBLE QUININE SALTS.

FREDERICK F. JOHNSON.[1,2]

In view of the evidence in a previous paper (1) and with the hope of preparing a series of more soluble and less acid quinine salts, attempts were made to prepare double salts by adding weakly dissociated organic acids to the quinoline nitrogen of quinine hydrochloride. A review of the literature brought to light seventy-nine quinine salts excluding those prepared for the purpose of separating optical isomers. It is hoped that this investigation and the new salts here recorded will subtract from rather than add to the present confusion. The only quinine salts reported thus far which have a weak acid on the quinoline nitrogen have been quinine diformate (2) which is soluble approximately 4%, and quinine disalicylosalicylate (3) which is insoluble. For the double salts discussed here, the first acid, as in quinine.HCl.CH_3COOH, will refer to the acid on the quinuclidine nitrogen, and the second acid will refer to that on the quinoline nitrogen. The difficulties involved in adding a weak acid to the quinoline nitrogen were studied in detail using acetic acid. A summary of the methods used and of the degrees of success is as follows:

Method 1.—Direct Solution. 2.0 Gm. of quinine hydrochloride would not dissolve in an equivalent of normal acetic acid. The acetic acid caused no increase in solubility and the hydrochloride was obtained pure by evaporation and drying.

Method 2.—Precipitation of Quinine.HCl.$^1/_2H_2SO_4$ with Barium Acetate. This was first tried in a concentrated solution and using equivalents of acetic acid and barium hydroxide. The results of several attempts were variable due to the formation of temporary concentrated colloidal solutions peptized by acetate ion. Attempts at crystallization always produced a mixture of quinine acetate and quinine hydrochloride. Crystallization of quinine.HCl.CH_3COOH was also a failure when an equivalent of barium acetate was added to a dilute solution of a quinine.HCl.$^1/_2H_2SO_4$. Addition of a large excess of potassium acetate and acetic acid to the crystallizing mixture caused precipitation of pure quinine acetate.

Method 3.—Crystallization from Alcohol. By the same method but using absolute alcohol instead of water, quinine hydrochloride was the only product that could be crystallized. When the same procedure was performed in 50% alcohol, a large precipitate of quinine acetate was obtained. The substance still in solution was crystallized five times from water and dried at room temperature. Analysis was as follows: 77.18% quinine, 8.64% HCl, 14.40% CH_3COOH, $^1/_2$ mol H_2O. This conforms to quinine.HCl.CH_3COOH. Solubility 10.7 Gm. per 100 cc. Per cent yield = 1.35.

Method 4.—Formation in Alcohol and Extraction with Ether. To a mixture of 6.00 Gm. of quinine.HCl and one equivalent of acetic acid in 5 cc. of absolute alcohol was added a large ex-

---

* Scientific Section, A. PH. A., New York meeting, 1937.

[1] Assistant State Chemist, Seattle, Washington.
[2] University of Washington, College of Pharmacy, Dept. of Pharmaceutical Chemistry.

cess of anhydrous ether. A large precipitate formed which was quinine hydrochloride. The ether was decanted and repeatedly evaporated until free from acetic acid and then extracted with water. From the water there was crystallized 0.37 Gm. of product assaying quinine.HCl.CH_3-COOH. Per cent quinine = 77.2. Per cent HCl + CH_3COOH = 22.93. Melting point: when heated rapidly the salt decomposed between 119° and 122° C.

Method 5.—Formation in Ether. Crystallization of equivalents of quinine.HCl and CH_3-COOH from ether was not successful.

Method 6.—Preparation in Solution by Barium Acetate Method. Accurately standardized equivalents of quinine.HCl.$^1/_2H_2SO_4$ and barium acetate were mixed slowly in dilute solution, the precipitate being centrifuged down after each addition. The solution was separated and concentrated to the saturation point. The following properties were determined: Solubility at 25° C. = 10.81 Gm. per 100 cc. p_H = 3.87. $[\alpha]_D^{25}$ = levo 165°. This product was apparently stable for two days and then precipitation occurred. When equilibrium was reached (after 8 days), the concentration was 3.16% as free quinine, and the p_H had decreased to 2.36. The precipitate was a mixture of quinine.HCl and quinine.CH_3COOH. A second preparation by the same method gave the following properties: Solubility = 10.84%, p_H = 3.87. Stable for 24 hours.

In order to compare properties, quinine.CH_3COOH.HCl was prepared. It would not crystallize from a hydrochloric acid solution of quinine.CH_3COOH, so quinine.CH_3COOH was dissolved in two equivalents of H_2SO_4 and precipitated with an equivalent of barium chloride. Crystallization was best from a 45:20 alcohol-ether mixture. A comparison of the properties of these two salts furnishes proof of their configuration.

Quinine.HCl.CH_3COOH.		Quinine.CH_3COOH.HCl.	
% quinine	= 77.20	% quinine	= 77.16
% acid	= 22.89	% acid	= 22.94
Solubility	= 10.84 Gm. per 100 cc.	Solubility	= 72.40 Gm. per 100 cc.
p_H of 10.84% soln.	= 3.87	p_H of 10.84% soln.	= 2.09
Unstable in solution.		Stable in solution.	

Quinine diacetate was prepared in solution by the same general method. The product was stable in a saturated solution of 2.15%. p_H = 4.60. Crystallization from water was successful but difficult.

Quinine.HCl.Propionate was prepared in solution by the same general method, that is, by precipitating the sulfate with an exact equivalent of barium propionate and evaporating to the saturation point. The analysis was quinine 7.82 Gm. per 100 cc., and total acid 2.68 Gm. per 100 cc. Properties at 20° C. were: Solubility = 10.47 Gm. per 100 cc.; p_H of saturated solution = 4.76; $[\alpha]_D^{20}$ = levo 137° at p_H 4.76. The p_H of these saturated solutions was determined with a glass electrode and 0.1 normal salt bridge. A pure product could not be obtained by crystallization from water.

Quinine.HCl.Valerate was prepared in solution by the same method. The analysis of the solution was quinine 8.32 Gm. per 100 cc., and total acid 3.56 Gm. per 100 cc. Properties at 20° C. were: Solubility = 11.87 Gm. per 100 cc.; p_H of saturated solution = 4.10; $[\alpha]_D^{20}$ = levo 131°. Crystallization from water was unsuccessful.

Quinine.HCl.Lactate was prepared in solution by the same method. The analysis of the saturated solution was quinine 82.66 Gm. per 100 cc., and total acid 32.74 Gm. per 100 cc. Properties at 20° C. were: Solubility = 114.9 Gm. per 100 cc.; p_H of saturated solution = 4.13; $[\alpha]_D^{20}$ = levo 153°. The product was

crystallized pure from water by maintaining a solution slightly below saturation at 5° C. for two weeks. Crystallization from ether-alcohol mixtures was unsuccessful.

SUMMARY.

The following new quinine salts were prepared with the weak acids added to the weak nitrogen: quinine.HCl.acetate, quinine diacetate, quinine.HCl.propionate, quinine.HCl.valerate and quinine.HCl.lactate. The latter is soluble 115 Gm. per 100 cc. of solution with a p_H of 4.13.

REFERENCES.

(1) Johnson, F. F., refer to Part I.
(2) Guigues, M. P., *J. pharm. chim.* (6), 24, 301 (1906).
(3) Merck and Co., Brit. 241,109; through *C. A.*, 20, 2564 (1926).

THE RANDOM SAMPLING ERROR AS A POSSIBLE ANSWER TO THE APPARENT VARIATIONS IN ANTISEPTIC TEST DATA.[1]

BY ARTHUR R. CADE.[2]

Lack of uniformity in the results of duplicate antiseptic tests, as obtained either by the same worker on different days using supposedly identical cultures and techniques, or by different workers using the same procedures, has brought about recently a somewhat extended discussion as to the cause for these differences in findings. Variation in the day-to-day resistance of the test organism has been suggested as the most probable cause, in a recent series of papers published by members of the AMERICAN PHARMACEUTICAL ASSOCIATION Committee who have investigated antiseptic testing procedures. As a result of this work by Gathercoal and his co-workers (1) there has been established and incorporated into the latest National Formulary a standard of resistance for the test organism *Staphylococcus aureus*, which appears to be slightly inferior to the standard set by the Food and Drug Administration of the United States Department of Agriculture (2). The specifications of the latter state that the test organism must live in 1–80 phenol for 5 minutes, and must be killed by the same concentration in 10 minutes, at 37° C. At the same time, the organism should live in 1–90 phenol solution for 10 minutes at 37° C. The National Formulary standard states that the organism must be killed in the 1–80 phenol solution in 10 minutes, but live in the 1–90 strength for 10 minutes at 37° C. Thus, the difference is that the National Formulary does not require that the organism remain alive in 1–80 phenol for 5 minutes, at 37° C., which requirement the F. D. A. insists upon. The National Formulary specifications have been so drawn up, it is claimed, because experience has taught that it is difficult to get an organism which will retain this resistance with any degree of

---

[1] The experiments reported in this paper form the basis for a thesis presented by Arthur R. Cade in partial fulfilment of the requirements for the degree of Doctor of Philosophy, at the University of Minnesota, December 1933.

[2] Consulting Chemist and Bacteriologist, Minneapolis, Minn.

practical consistency, even though it does show exactly this resistance at intervals. The newly adopted requirement, on the other hand, can be consistently obtained by workers experienced in the field of antiseptic testing. Opposing this viewpoint, Reddish (3), who himself assisted in drawing up the F. D. A. specifications, says: "It is unfortunate that the National Formulary VI standard of resistance should be different from the F. D. A. standard" because "this variation will cause considerable confusion and will even lead to the use of weak cultures by unscrupulous manufacturers of antiseptics. . . . . .The use of such weak cultures should not be allowed in any test." Reddish also states "Meyer and Gathercoal are the only bacteriologists, as far as I know, who have experienced any difficulty in getting the resistance to phenol specified in circular 198, when the F. D. A. strain (No. 209) of *Staphylococcus aureus* is used. . . . .It has been my experience, as well as that of others working in this field, that the F. D. A. strain of *Staphylococcus aureus* (No. 209) very seldom varies from the maximum standard defined in circular 198, and almost never falls below the minimum standard. When the culture does fall below the minimum standard of resistance, it means that the organism has become weakened for some reason."

In an attempt to assist in solving this interesting controversial point, the writer has made a study of the data collected by him over a period of several years of antiseptic testing. The results seem to indicate that the two points of view are not as far apart as they may appear. In fact, the two apparently contradictory sets of data may actually be in rather close agreement. The difficulty is that past workers have failed to interpret their data mathematically, and have ignored what the writer chooses to call the error of random sampling. When this important factor is taken into consideration, it may be seen that it, as well as the day-to-day variation in test organism resistance, plays a most important rôle in explaining why certain control test data do not check, especially with regard to getting an organism to live for 5 minutes in 1–80 phenol at 37° C. in every test. After consideration of this factor, it would seem that to insist that the test organism must always survive 5-minute contact with 1–80 phenol, in the F. D. A. technique, is a bit too rigid for practical purposes, and that failure to meet this requirement does not necessarily mean that the test organism is weaker than one which does meet it. The writer agrees that a culture of lowered resistance should not be used in a standard antiseptic test, but he attempts to show by these data that negative results may sometimes be obtained in the five-minute test with 1–80 phenol even with an organism of standard resistance.

A test procedure is also suggested here which gives data which are quantitatively more accurate than those obtained with the standard procedure of the F. D. A. and which enables the worker, better to evaluate the resistance of his test organism when the 1–80 phenol control test is negative rather than positive. A brief discussion of the random sampling error and its application to these test data follows.

It is obvious that when a person removes a given sample from a suspension which contains relatively few bacteria, the sample removed may or may not contain organisms. The chances of getting a sterile sample depend upon the original population in the suspension; therefore, if the sample removed contains no organ-

isms, it is not safe to conclude that the original suspension was sterile. A somewhat similar situation exists when one considers the likelihood of removing a sample containing a given number of organisms. The possibility of obtaining this given number is naturally dependent upon the original population. When a sample is removed, a number greater or less than that looked for may be obtained. For example, suppose that the suspension contains 25 bacteria per cc., and that 1-cc. samples are removed. Some of these samples will contain 25 bacteria, others less, perhaps only 15, and still others more than 25, perhaps as many as 40. These variations are controlled by the laws of probability, and to calculate the error, it is necessary to resort to the rules of statistics.

When using a technique such as the Rideal-Walker or that of the F. D. A. test, one should remember that the removal of a loopful of solution to broth subculture tubes with no resultant growth in the latter does not necessarily indicate that the seed culture was sterile. The loop may simply have removed a sterile sample from a suspension containing viable organisms. In determining the limiting concentration of a chemical that will kill a broth suspension of organisms, one should bring about a condition wherein almost but not quite complete sterilization is obtained. When working with such borderline concentrations of germicides, it will be found that duplicate samples will not produce identical results. If one obtains no growth in a single test, or even in several tests, it certainly will not be safe to conclude that the original suspension was sterile. Another investigator, using the same materials and the same technique, may get growth in single or in duplicate tests, but this would not necessarily mean poorer germicidal efficiency.

With the plating technique, an occasional plate may show a count considerably above or below the average. This may be due to errors in technique, but it may equally well be due to the error of random sampling. The mathematical principle here involved has been carefully studied and reported in a series of papers by Halvorson and Ziegler (4) who show, for example, that if a 1-cc. sample is removed from a suspension containing 10 organisms per cc., there exists a reasonable chance that the sample removed will be sterile. On the other hand, if a 1-cc. sample is removed from a suspension containing 1 organism in 10 cc., there is still a reasonable chance that a positive sample will be obtained. This error of random sampling is always present, even though all other variables are completely eliminated. In actual practice, of course, other errors such as varying resistance of the organism or variation in the size of loopful, add to the random sampling error and make the range of counts even wider. On the basis of the above, it is obvious that very little confidence can be placed in a single test.

However, one can determine the most probable number of organisms present by applying the formula: $q/n = e^{-ax}$, wherein q is the number of tubes showing no growth, n is the total number of tubes inoculated, and e^{-ax} is the percentage of sterile tubes. Halvorson and Ziegler have calculated for various values of e^{-ax}, or percentage of sterile tubes, the corresponding value of x (where $a = 1$), which is the most probable number of organisms per cc. which could be present and produce the given result. Reversing these calculations, the percentage of times one could expect to get no growth from loopfuls removed from suspensions containing a given number of organisms per cc. would be as follows:

If There Are in the Tube:	Percentage of Times Loopful Would Be Sterile (e^{-ax}).
10 organisms per cc.	90.4 %
25 organisms per cc.	72.8 %
45 organisms per cc.	63.7 %
50 organisms per cc.	60.6 %
69 organisms per cc.	50.1 %
100 organisms per cc.	36.7 %
130 organisms per cc.	27.2 %
150 organisms per cc.	22.3 %
200 organisms per cc.	13.5 %
250 organisms per cc.	8.2 %
300 organisms per cc.	4.9 %
500 organisms per cc.	0.6 %
1000 organisms per cc.	0.005%

Thus, for example, if the seed culture contains 69 bacteria per cc., the subculture tubes would be negative 50.1% of the time. Also, with 25 bacteria per cc. in the seed tube, the subculture tubes would be negative 72.8% of the time. Ten organisms per cc. would show no growth 90.4% of the time. Therefore, for a single test, several subcultures must be made before one can conclude positively that the seed-culture tube was completely sterile.

In Gathercoal's most recent paper (5) he presented tables which showed variations in duplicate test results on control tests with the standard organism in contact with 1–80 and 1–90 phenol solutions at 37° C. for 5 minutes. Sometimes results were negative, sometimes positive. On the basis of these data, the author states that one cannot obtain positive results consistently in this test. He explains the contradictory results as due to a day-to-day variation in resistance of the test organism. Considering his data in the light of the random sampling error we may conclude that such results are to be expected and are not to be considered contradictory. Quantitative data from plate counts, however, rather than merely positive and negative readings, are needed to prove this point conclusively.

For example, in that part of Chart III which gives the results with the F. D. A. standard organism strain No. 209, tested with 1–80 phenol for 5 minutes, it will be noted that there are three negative findings out of 11 tests, or 27.2% negative results. Likewise, observing the other borderline data to which the random sampling error applies, namely, the 1–90 phenol, 15-minute tests, we find the author has obtained 7 negative results out of 11 tests, or 63.7%. Referring to the above table, we find that the most probable population which would give 27.2% negative results is 130 bacteria per cc. For 63.7% the corresponding population is 45. Thus the random sampling error, rather than variation in organism resistance, may be the explanation of why Gathercoal found organisms growing in some subculture tubes and not in others, when in reality probably none of the original seed culture tubes was sterile, but contained approximately the same number of viable organisms.

A more quantitative study of this problem is indicated by the following tables of data taken from the writer's findings. In all this work, the standard F. D. A. procedure was followed, and strain No. 209 was used. Plate counts, however, were taken to determine the numbers of organisms present at the end of the contact

period, instead of the ordinary procedure of transferring loopfuls of broth and recording only absence or presence of growth.

In Table I are presented data taken from control tests made over a period of several years, showing the number of viable organisms per loopful left in the seed tubes after the standard organism had contacted the different phenol concentrations for 5 minutes.

TABLE I.—COLONY COUNTS FOR LOOPFUL OF CULTURE TO AGAR AFTER BEING PLACED IN PHENOL OF DILUTIONS AS NOTED FOR 5 MINUTES AT 37° C.

Test Number.	Plate Counts. 1–80 Phenol.	1–90 Phenol.	1–100 Phenol.	Test Number.	Plate Counts. 1–80 Phenol.	1–90 Phenol.	1–100 Phenol.
1	3	53	850	41	2	125	350
2	0	43	400	42	4	150	400
3	0	9	40	43	0	69	200
4	2	55	125	44	19	57	110
5	0	40	200	45	26	100	200
6	1	30	150	46	3	53	850
7	4	95	350	47	0	43	400
8	3	28	850	48	1	55	125
9	4	200	550	49	0	40	200
10	0	49	440	50	1	30	150
11	29	250	850	51	4	95	350
12	0	53	200	52	3	28	850
13	6	100	225	53	0	49	450
14	1	19	150	54	0	53	200
15	29	150	200	55	1	19	150
16	0	37	150	56	1	37	160
17	1	19	150	57	1	19	170
18	0	24	160	58	0	24	150
19	0	31	225	59	0	31	225
20	1	88	400	60	3	150	375
21	1	250	650	61	2	250	200
22	0	17	150	62	0	300	500
23	14	85	350	63	2	450	600
24	0	112	300	64	1	70	450
25	1	125	500	65	20	40	100
26	5	150	375	66	5	55	550
27	1	15	450	67	1	450	450
28	2	49	100	68	0	25	250
29	3	40	175	69	5	14	400
30	4	85	300	70	3	350	450
31	7	72	150	71	1	150	320
32	5	150	200	72	19	67	300
33	7	18	450	73	0	75	250
34	4	175	500	74	0	90	220
35	1	19	100	75	0	43	400
36	0	10	100	76	1	59	210
37	23	40	175	77	0	40	200
38	0	37	250	78	1	30	150
39	1	25	150	79	4	95	350
40	6	35	800	80	3	28	550

These data show that the average number of viable bacteria remaining after the standard organism has contacted 1–80 phenol for 5 min. at 37° C. is between 1

and 2 per loopful, or 150 ± 50 per cc. Theoretically, therefore, one would expect to get negative results between 13.5% and 36.7% of the time. Actually, these tests show negative results 31% of the time, which is well within the theoretical range. There are eight counts for the 1–80 dilution marked with an asterisk because they are abnormally high. These figures alone would lead one to believe that the organism was of extra high resistance, but when considered in the light of the corresponding data for the 1–90 and 1–100 dilutions, it appears that the organism is about normal, and that the figures marked are merely abnormal variations from the average, as might be expected in biological data. These 8 figures, of course, are not included in calculating the average, as it would be mathematically inaccurate to do so.

Table II gives average data obtained from several hundred other tests. These data are included to show the average counts obtained, from which the writer determined the maximum and minimum counts allowable to decide whether the organism used in each series of germicidal tests was of the standard resistance. These data show that the results obtained for one dilution may not be at all typical, and that it is necessary to have data from at least two, namely, 1–80 and 1–90 dilutions, and preferably from three, including 1–100, before one can be sure that the organism really is of average resistance. Thus, if the 1–80 phenol data are not normal, as may frequently be the case, the 1–90 and 1–100 dilution data will reveal the facts, and thereby prevent the making of false deductions.

The data in Table II were compiled several years ago from hundreds of tests carried out previous to that time. It has been used as a standard for determining whether a given culture to be used in tests carried out by the writer was of standard resistance.

TABLE II.—PLATE COUNTS OF LOOPFULS TRANSFERRED FROM SEED CULTURES OF STRENGTHS AND FOR CONTACT TIMES AS NOTED.

Phenol Dilution.	Period of Contact. 5 Min.	10 Min.	15 Min.
1–80	2 5 8	0 0 0	0 0 0
1–80	0 1 1	0 0 0	0 0 0
1–80	2 0 0	0 0 0	0 0 0
1–80	1 5 0	0 0 0	0 0 0
1–90	250 55	8 0 12	0 0 1
1–90	300 450	0 2 22	0 2 0
1–90	450 25	20 8 50	0 0 0
1–90	70 14	85 2 10	1 0 0
1–100	200 550	85 110	150 5
1–100	500 450	50 400	200 4
1–100	600 250	25 450	3 3
1–100	450 400	50 200	100 15
Averages:			
1–80	2	0	0
1–90	202	18	0.3
1–100	420	170	60
Counts considered as showing test organism to have standard resistance:			
1–80	0– 15	0	0
1–90	50–500	1–100	0– 10
1–100	100–800	50–450	5–200

It is interesting to note that these data also substantiate the findings as in Table I above, and the results of Gathercoal, namely, that contact of the standard test organism with 1–80 phenol for 5 minutes at 37° C. produces 33% negative results. The results in Table I, taken from tests carried out several years later, showed 31% negative, and Gathercoal's data show 27.2%. These percentages check within mathematical error. Likewise, the 1–90 15-minute phenol data in Table II show 75% negative, while Gathercoal found 63.7% again showing agreement, and indicating that the + and − variations in findings are due to the random sampling error and not to a change in the resistance of the test organism.

The writer has made a further study of other variables which affect the results of standard antiseptic tests and the degree to which they must be controlled in order to be within the probable error of the testing technique as a whole. These findings will be reported later in a separate paper. However, there is included here one of these other variables, namely, the effect of variations in the purity and strength of phenol solutions, because it applies more or less directly to the specific problem discussed in this paper. An attempt has been made to find how wide a variation in these phenol factors is permissible before they affect the test results sufficiently to be of greater importance than the random sampling error, which, it is assumed, sets the limit of accuracy for the test itself.

The data as presented in Table III show the variations in findings when using three different grades of pure phenol and weighing these in two different precision manners. The three phenols used included Mallinckrodt's Reagent Grade (A), Merck's Blue Label Grade (B), and a phenol solution standardized by an outside consulting chemical laboratory (C). The first two grades were weighed on an analytical balance accurate to the third decimal point, with a duplicate series weighed on an ordinary laboratory trip balance, accurate only to the first decimal point.

The results show that all samples were reasonably equivalent in their effect upon the test organism, and that the two unstandardized grades were equal in effect to the standard solution. In addition, it is noted that a 1% error in weighing the phenol did not produce any material disagreement in the test results.

TABLE III.—VARIATIONS IN THE STANDARD PHENOL SOLUTION.

Exp. No.	Solution.	Age of 5% Phenol Solution When Dilution Was Made.	Age of Dilution.	Counts after 5 Min. at 37° C. 1–80.	1–90.	1–100.
1	A	1 month	1 day	2	100	...
2	A	1 day	1 day	4	75	...
3	A	1 day	1 day	5	125	...
4	A	1 day	1 week	0	10	60
5	A	2 months	1 day	1	14	28
6	B	1 day	1 day	0	36	...
7	B	1 day	1 day	1	19	100
8	B	1 month	1 day	0	110	300
9	B	1 month	1 day	3	40	175
10	B	1 month	1 week	2	65	240
11	AB	1 month	1 week	0	21	126
12	AB	1 month	2 weeks	5	18	320
13	AB	2 months	1 day	1	26	450
14	AB	2 months	2 weeks	3	150	300
15	AB	2 months	2 weeks	0	29	...

TABLE III.—(*Continued from page 1239.*)

16	C	1 day	1 day	2	100	...
17	C	1 day	1 day	6	29	...
18	C	1 week	1 day	1	50	220
19	C	1 week	1 day	0	17	120
20	C	1 month	1 day	2	61	...
21	C	1 week	1 week	2	49	100
22	C	1 week	1 week	5	54	210
23	C	1 week	2 weeks	1	150	400
24	C	1 week	2 weeks	2	100	350
25	C	1 week	3 weeks	0	150	375
26	C	1 week	3 weeks	2	100	450
27	C	1 month	1 day	5	88	420
28	C	1 month	1 day	0	84	350
29	C	2 months	1 day	2	100	210
30	C	2 months	1 day	4	110	150

A, Mallinckrodt's Reagent Grade Phenol.
B, Merck's Blue Label Grade.
AB, Mixture of equal parts of A and B.
C, Standardized phenol solution.

The data in Table III show that the stock solution of phenol, 5% keeps uniform in strength for several months, if kept away from the action of light in a glass-stoppered bottle, and that the dilutions 1–80, 1–90 and 1–100 keep satisfactorily for a few weeks.

CONCLUSIONS.

Evidence is presented in this paper to show that the random sampling error may account for the apparent discrepancy in results obtained by both Gathercoal and Reddish, as presented in their recent papers, and also that one may expect negative results with 1–80 phenol at 37° C., using the standard F. D. A. test organism, No. 209, up to approximately 35% of the time, even with an organism of standard resistance and an equivalent actual population in each of the seed tubes.

A new procedure is presented which may be used to determine quantitatively whether the test organism is of normal resistance, and whether the test data obtained with it are reliable and comparable to other data.

Experimental evidence presented indicates that a 5% stock solution of phenol will keep several months; and that the dilution used for the control tests will keep several weeks without changing sufficiently to affect materially the test results.

REFERENCES.

(1) Meyer, Esther, and Gathercoal, E. N., "The F. D. A. Test for Antiseptic Value of Liquid Antiseptics," JOUR. A. PH. A., 25, No. 3, 212–215 (March 1936).

(2) U. S. Food and Drug Administration Methods for Testing Antiseptics and Disinfectants, Circular 198 (1931).

(3) Reddish, Geo. F., "Antiseptic Testing," *Soap*, 109 (June 1936).

(4) Halvorson, H. O., and Ziegler, N. R., "Application of Statistics to Problems in Bacteriology," *J. Bact.*, 25, No. 2, 101–121 (February 1933).

(5) Vicher, E. E., Meyer, Esther, and Gathercoal, E. N., "Phenol Resistance of *Staphylococcus aureus*," JOUR. A. PH. A., 25, No. 7, 590–593 (July 1937).

AN IMPROVED CALOMEL OINTMENT.*

BY E. E. VICHER, R. K. SNYDER AND E. N. GATHERCOAL.

INTRODUCTION.

Information to the effect that the calomel ointment of National Formulary VI produced an insufficient response to the F. D. A. Agar Plate Antiseptic Test to be considered antiseptic, led to an investigation of this product.

This ointment, prepared carefully after the N. F. VI formula, produces zones of inhibition up to 2 mm. in width. The N. F. V ointment, with white petrolatum as a base, instead of equal parts of hydrous wool fat and white petrolatum as in N. F. VI, gives inhibition zones almost identical with those produced by the N. F. VI ointment. Several samples of calomel ointment purchased on the open market yield inhibition zones from 1.0 mm. to 2.0 mm. in width.

It was considered undesirable to fortify calomel ointment with another antiseptic, even with a more easily soluble inorganic mercury compound. If any known antiseptic be added to the ointment its presence must be stated in the name of the ointment and on the label.

As certain insoluble salts or even elements acquire new or increased pharmacologic activity when reduced to the colloidal state, this process was attempted with calomel.

Precipitation of a newly formed salt in the presence of protective colloids tends to form colloidal suspensions of the insoluble salt. Acacia and gelatin are protective colloids commonly used for such a purpose.

SIZE OF CALOMEL PARTICLES.

Microscopic examination of various calomels indicates a variation in length of particles from 2 microns to 110 microns (1). U. S. P. Calomel shows a variation in length of from 2 microns to 50 microns, the average length of single crystals being about 7 microns.

In calomel suspensions prepared in this work, the maximum size of the visible calomel particles was 0.8 microns. Most of the visible particles were smaller and many particles were present that could not be seen under an oil-immersion lens; probably those invisible particles approach colloidal size. Ointments prepared from this new calomel developed much higher antiseptic power. Could the reduction in the size of the particles account for this?

PREPARATION OF THE NEW CALOMEL.

Pell Broady and C. B. Jordan (2) of Purdue University School of Pharmacy have developed a method for the preparation of what they termed "Colloidal Calomel." A solution of sodium chloride was added slowly to a 2 per cent solution of gelatin and to this was added a dilute solution of mercurous nitrate slowly with constant agitation. The resulting product was a stable suspension of calomel.

By calculation each 10 Gm. of mercurous nitrate requires 2.05 Gm. of sodium chloride to precipitate 8.41 Gm. of calomel.

Varying amounts of gelatin were used in the early precipitations (0.5%, 1.0%, 1.5% and 2.0%) prepared by us. It was found that the maximum size of the particles of calomel obtained

* National Formulary Research Project F 23 in progress at the University of Illinois School of Pharmacy.

in all cases was 0.5 microns. The stability of the suspensions, however, varied in direct proportion to the concentration of gelatin used, that containing 2% gelatin being the most stable.

The first lots of calomel were repeatedly washed by a process of centrifuging and decantation, but the constant cloudiness of the supernates despite long and continued centrifuging indicated that the smallest particles were being thrown away. This method was replaced by a dialysis of the suspension. Such a dialysis continued for 8 to 12 hours assured a completely neutral, pure suspension of the calomel in gelatin solution.

The following general method was eventually followed: Dissolve 3 parts of mercurous nitrate in 100 parts of acidulated water (nitric acid 1, water 100). Dissolve 2 parts of gelatin and 1.2 parts of sodium chloride in 100 parts of water. Add the mercurous nitrate solution drop by drop (about one drop per second) to the NaCl-gelatin solution which is under constant agitation by mechanical stirring. Wash the suspension by dialysis until free from acidity and soluble salts. Concentrate by evaporation in a vacuum pan until the concentrate contains 1 Gm. of calomel in 3 Gm. of the suspension. This concentrated suspension is permanent and suitable for incorporation into the ointment base.

PREPARATION OF THE CALOMEL OINTMENTS.

Calomel ointments, N. F. V and N. F. VI were prepared by the official method.

The new calomel used in the first ointments was centrifuged, washed, dried and resuspended in pure water. Later the ointments were made with calomel that had been centrifuged, washed and resuspended but not dried. The third group of ointments contained calomel suspension that had been dialyzed and concentrated. All of these ointments were made up with the official calomel ointment base.

The following formula was used for ointment made with the concentrated suspension: Into 70 parts by weight of ointment base, incorporate 90 parts by weight of suspension (containing 30 parts by weight of calomel) to make 160 parts by weight of ointment.

In reality this gives an ointment containing about 18 per cent of calomel (anhydrous).

ANTISEPTIC PROPERTIES OF CALOMEL OINTMENT.

Tests for the antiseptic power of ointments are usually run after the F. D. A. Agar Plate Technic (9).

In our work, 20 cc. of the specially prepared agar were used in each 100-mm. petri dish. The test organism was *Staph. aureus* A-209 grown in the special broth. After the melted agar had been inoculated with the test organism and the plates poured, a 2.0-Gm. sample of the ointment being tested was placed in intimate contact with a small area of the inoculated agar, using a suitable spatula for transfer from the covered sterile watch glass in which the ointment had been accurately weighed. The spatula was warmed before taking up the ointment sample to assure as complete a transfer as possible and to warm that portion of the ointment which was to be in contact with the agar surface so as to make that contact as intimate as possible. After incubation for 24 hours, the width of the inhibition zone was measured.

The following tabulation gives the results of the test on a wide variety of ointments:

Name of Ointment.	Number of Tests.	Width of Inhibition Zone.
Hydrous Wool Fat	2	None
White Petrolatum	2	None
N. F. VI Base	2	None
Calomel Ointment, N. F. V	3	1.5 to 2.0 mm.
Calomel Ointment, N. F. VI	7	0.5 to 2.0 mm.
Ointment made with a fine, precipitated calomel; particles average 2 microns	2	1.5 to 2.0 mm.

Ointment of an old sample of calomel; particles up to 100 microns long	1	0.5 to 1.0 mm.
Ointment with an English calomel; particles 9 to 110 microns long	1	0.5 to 1.0 mm.
Commercial calomel ointments in collapsible tubes	4	1.0 to 2.0 mm.
Ointment of Mercuric Chloride, 1–100	3	10.0 to 12.0 mm.
Ointment of Mercuric Chloride, 1–1000	3	5.0 to 6.0 mm.
Ointment of Mercuric Chloride, 1–10,000	3	1.5 to 2.0 mm.
Ointment with 10% of the new calomel (0.5%, 1.0%, 1.5%, 2.0% gelatin)	8	4.0 to 6.0 mm.
Ointment with 18% of the new calomel, centrifuged and in concentrated suspension	10	7.0 to 8.0 mm.
Ointment with 18% of the new calomel, dialyzed and in concentrated suspension	52	7.0 to 12.0 mm.
Ointment with 1.8% of the new calomel		4.0 to 6.0 mm.
Ointment with 0.18% of new calomel		2.0 mm.
Ointment with 0.018% of new calomel		1.0 mm.
Ointment with 0.0018% of new calomel		0.5 mm.

Results Obtained by Reddish and Wales (3).

Calomel Ointment	1.5 mm.
Ointment of Ammoniated Mercury	4.0 mm.
Ointment of Red Oxide of Mercury	4.0 mm.
Ointment of Yellow Oxide of Mercury	4.0 mm.
Mild Mercurial Ointment	7.0 mm.
Ointment of Mercurous Nitrate (Citrine Ointment)	13.0 mm.
Iodine Ointment	8.0 mm.
Ointment of Pine Tar	3.0 mm.

In an effort to determine the antiseptic value of the compound formed by mercurous nitrate and gelatin, the usual solution of mercurous nitrate was added to the 2 per cent gelatin solution from which the sodium chloride had been omitted. A precipitate was formed which remained in suspension and could be washed by dialysis as had been done previously with the calomel-gelatin suspension. The washed suspension was concentrated to contain the equivalent of 30 per cent of mercurous nitrate and this concentrate was then incorporated into an ointment after the regular formula for the new calomel ointment. This ointment gave by the F. D. A. Test a 4.0-mm. zone.

An 18% ointment was prepared using a calomel which had been precipitated in an NaCl-acacia solution instead of the NaCl-gelatin solution; *i. e.*, 2 per cent of acacia was substituted for the 2 per cent of gelatin. The size of the largest calomel particles in the suspension was found to be 0.8 microns. This ointment when tested for its inhibitory action by the F. D. A. Agar Plate Technic displayed a zone of 7.0 to 8.0 mm.

The antiseptic power of the suspension of the new calomel determined by the F. D. A. Antiseptic Test for liquids indicates no greater antiseptic power than that shown by a suspension of U. S. P. Calomel in a dilute gelatin solution.

A lot of the ointment containing the new calomel was put into porcelain jars and another lot into collapsible ointment tubes of one ounce capacity. The F. D. A. Agar Plate Test shows no decrease in antiseptic power of either lot of ointment up to three months of age. The testing will be continued to determine the extent of

deterioration, if any. Samples of the official ointment of a year or more in age apparently show some decrease in antiseptic power, as indicated in tests on commercial samples.

THE ASSAY OF CALOMEL SUSPENSION.

An assay for the calomel suspension and of the ointment containing the new calomel has been sought. The usual oxidation methods tended to volatilize the calomel. By first converting the chloride to the less volatile oxide, the following method gave results of 97 to 98 per cent of theoretical.

Place the accurately weighed calomel-gelatin suspension corresponding to about 0.5 Gm. of calomel into an acetylization flask. Add 50 cc. of a 10% solution of KOH in 80% alcohol and reflux on a water-bath for 3 hours; cool and filter (using a dry funnel and filter). Wash the flask and filter with 80% alcohol to remove excess chloride, dry the filter and contents and return to the flask. Add 10 cc. of sulfuric acid, and reflux over a direct flame until complete decomposition is effected (charring); cool, add 15 cc. of nitric acid and heat (without refluxing) until nitric acid fumes are driven off. Transfer the clear colorless liquid quantitatively to a 250-cc. volumetric flask, add distilled water to make 250 cc. of solution, and treat a 50-cc. aliquot, diluted with distilled water to 100 cc., with H_2S until complete precipitation of HgS has occurred. Filter through a tared Gooch crucible and repeatedly wash the HgS with distilled water, then three times with alcohol and followed with CS_2 until the latter washings when evaporated on a small watch glass leave no visible material. Wash the precipitate again about three times with alcohol to remove the CS_2, air dry for a short time and dry to constant weight at 110° C.

TOXICITY AND ABSORPTION OF CALOMEL OINTMENT.

A review of the literature (4, 5, 6, 7, 8) indicates that the official calomel ointment is absorbed through the skin of rabbits to produce diarrhea, and fatal poisoning. The diarrhea appears usually on the second day and death ensues in from 5 to 20 days. The fatal dose is at least 1 Gm. of calomel. Larger and repeated doses cause death more promptly.

The inunction of calomel ointment on man occasionally produces a mild stomatitis but no salivation.

Our work shows that 2- to 4-Gm. doses of the official and the "new" calomel ointments result in diarrhea on the first or second day after inunction and in death on the fourth to twentieth day.

Doses of 0.25 Gm. to 1.00 Gm. of ointment usually were not fatal.

The new calomel ointment exhibited but slightly higher toxicity than the official ointment.

SUMMARY.

1. The size of particles in U. S. P. calomel varies from 2 to 50 microns in length, and in certain old calomels the maximum size reaches 110 microns.

2. The new calomel, consisting of particles 0.8 micron or less in size, was prepared by slowly adding, with constant agitation, a 3% solution of mercurous

nitrate to an equal volume of a solution containing 2% of gelatin and 1.2% of sodium chloride. This suspension of calomel in gelatin is washed by dialysis and concentrated to contain 1 Gm. of calomel in 3 Gm. of the suspension. The suspension is permanent and can be incorporated directly into the ointment base.

3. Official calomel ointments were found to possess an inhibitory action which gave clear zones in the F. D. A. Agar Plate Test varying from 0.5 to 2.0 mm., whereas ointments prepared from the new calomel displayed zones of from 7 to 12 mm. in width.

4. Few ointments produce a broader zone in the F. D. A. Agar Plate Test than the new calomel ointment; of the official ones, only Citrine Ointment (Ointment of Mercurous Nitrate).

5. The official calomel ointment corresponds in antiseptic value to a 1 to 10,000 mercuric chloride ointment, but the new calomel ointment is more than equivalent to a 1–1000 mercuric chloride ointment.

6. A dilution of the suspension of calomel, containing 1 part of calomel (by weight) in 1000 parts of dilution (by volume), has a phenol coefficient about equal to that of a 1% phenol solution.

7. The new calomel ointment apparently is stable; no decrease in antiseptic power of the ointment is noted after three months' aging.

8. It was found that only slight differences exist in the toxicity on rabbits between the official ointment and the new calomel ointment, although the rate of absorption of the new calomel appeared to be more rapid than that of the official product.

REFERENCES.

(1) LaWall, C. H., and Harrisson, J. W. E., "A Study of Calomel from the Physical and the Chemical Standpoint," JOUR. A. PH. A., 24, 97 (1935).

(2) Broady, P., and Jordan, C. B., "Some Applications of Colloidal Chemistry to Pharmacy," *Ibid.*, 16, 425 (1927).

(3) Reddish, G. F., and Wales, H., "Antiseptic Action of U. S. P. and N. F. Ointments," *Ibid.*, 18, 576 (1929).

(4) Schamberg, J. F., Kolmer, J. A., Raiziss, G. W., and Gavron, J. L., "Experimental Studies of the Mode of Absorption of Mercury When Applied by Inunction," *J. A. M. A.*, 70, 142 (1918).

(5) Maurel, E., and Arnard, "Comparison des doses of bichlorure de mercure pouvant donner la diarrhee au lapin avee celles qui redent ses urines albumineuses," *Compt. rend. soc. biol.*, 68, 675 (1910).

(6) Nichols, H. J., and Walker, J. E., "Experimental Observations on the Prophylaxis and Treatment of Syphilis," *J. Exptl. Med.*, 37, 525 (1923).

(7) Cole, H. N., and Littmen, J., "A Clinical Study of the Use of Calomel Inunctions," *J. A. M. A.*, 73, 1409 (1919).

(8) Wile, U. J., and Elliot, J. A., "Further Studies on the Mode of Absorption of Mercury in the Inunction Treatment of Syphilis," *J. Cutaneous Diseases*, 37, 595 (1917).

(9) Ruehle, G. L. A., and Brewer, G. M., "United States Food and Drug Administration Methods of Testing Antiseptics and Disinfectants," U. S. Dept. of Agriculture Circular, No. 198 (1931).

DRUG EXTRACTION. XIV. THE EXTRACTION OF PODOPHYLLUM.*

BY WILLIAM J. HUSA[1] AND PAUL FEHDER.[2]

Although the N. F. VI has adopted a mixture of 9 volumes of alcohol and 1 volume of water in place of the alcohol of the U. S. P. X, as menstruum for the preparation of resins of jalap and ipomea, the U. S. P. XI has retained the U. S. P. X menstruum of alcohol for the preparation of resin of podophyllum. Husa and Fehder have shown that alcohol is a better menstruum than the hydro-alcoholic menstruum of the N. F. VI for the preparation of resin of jalap (1) and resin of ipomea (2). In the present paper a report is made of experiments which were conducted to determine the relative value of alcohol and alcohol-water mixture (9:1) as menstrua for the preparation of resin of podophyllum, from the standpoint of rate of extraction, purity and yield of resin.

EXPERIMENTAL DATA.

Effect of Alcohol and Alcohol-Water Mixture (9:1) on Rate of Extraction.—Podophyllum, U. S. P., in fine powder, containing 7.41 per cent of resin by the U. S. P. XI assay method, was percolated with alcohol and with a mixture of alcohol 9 volumes—water 1 volume. Two 500-Gm. portions were extracted with alcohol, using 250 cc. of moistening liquid and with a maceration period of 48 hours after packing. Two other percolations, employing the alcohol-water mixture, were carried out in the same manner. Percolation was conducted at the rate of 50 cc. per hour, the percolates being collected in successive fractions of 250 cc., 250 cc., 250 cc. and 500 cc. The various fractions of percolate were assayed for resin by the U. S. P. XI assay method and for total extractive. The assay procedure was modified by heating the resins in a Freas vacuum oven at a temperature of 75–80° C., at one-hour intervals, until the loss between two successive heating periods was not more than 0.8 mg. in the resin determinations and not more than 2 mg. in the total extractive determinations. The results, which are shown in Table I, are averages of duplicate experiments.

TABLE I.—PERCOLATION OF PODOPHYLLUM WITH ALCOHOL AND WITH ALCOHOL-WATER MIXTURE (9:1).

	Gm. of Resin in Various Fractions of Percolate.		Gm. of Total Extractive in Various Fractions of Percolate.	
Percolates.	Alcohol.	Alc. 9 Vol.—Water 1 Vol.	Alcohol.	Alc. 9 Vol — Water 1 Vol.
250 cc.	26.6	27.1	31.1	36.6
250 cc.	5.8	6.0	9.4	13.1
250 cc.	1.1	1.4	3.0	6.6
500 cc.	0.8	1.1	3.5	7.6
Total	34.3	35.6	47.0	63.9

The results in Table I indicate that the two menstrua extract resin at practically the same rate. The alcohol-water mixture takes out more extractive matter in each fraction of percolate, the difference in the later fractions being relatively greater than in the first fraction. From 500 Gm. of drug, the more aqueous menstruum removed 1.3 Gm. more of resin and about 17 Gm. more of total extractive.

Comparison of the Effects of Alcohol and Alcohol-Water Mixture (9:1) on the Preparation of Resin of Podophyllum.—Experiments were conducted to determine how a mixture of alcohol 9

---

* Scientific Section, A. PH. A., New York meeting, 1937.

[1] Head Professor of Pharmacy, University of Florida.

[2] This paper is based on part of a dissertation presented to the Graduate Council of the University of Florida by Paul Fehder, in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

volumes—water 1 volume would compare with alcohol as a menstruum for the preparation of resin of podophyllum.

Two different lots of resin of podophyllum were prepared from 500-Gm. portions of podophyllum, in fine powder, using alcohol as the menstruum; each 500-Gm. portion of drug was moistened with 250 cc. of menstruum before packing. A maceration period of 48 hours after packing was included in the extraction procedure. Percolation was carried out at an average rate of 50 cc. per hour, 1250 cc. of percolate being collected from each 500-Gm. portion of drug. Each percolate was concentrated to the consistency of a syrup (reached at a volume of about 150 cc.) by distillation under reduced pressure. The resins were precipitated from the concentrated percolates, according to the method of the U. S. P. XI. After washing, the precipitates were air-dried in a dark place, and were then transferred, as completely as possible, to tared evaporating dishes, in which they were heated to constant weight in a vacuum oven at 75–80° C., the weight being considered constant when the difference between two weighings was not more than 0.1 Gm. The dishes were kept in a dark place between heating periods to avoid decomposition of the resins by light.

Two portions of resin of podophyllum were also prepared from 500-Gm. portions of podophyllum, maintaining the same experimental details as before, except that a mixture of 9 volumes of alcohol and 1 volume of water was used as menstruum, and that the concentration of percolate was carried out by distilling the first 250-cc. fractions under reduced pressure, as described above, and then by concentrating the remainder of the percolates on a water-bath, exposed to the air, but in such a manner that the temperature of the liquid did not rise above 80–90° C. during the evaporation. The percolates were concentrated to a syrupy consistency (reached at a volume of about 250 cc.).

The average yield of resin of podophyllum obtained from the two 500-Gm. portions of podophyllum extracted with U. S. P. alcohol was 5.4 per cent, while from the two portions extracted with the alcohol-water mixture (9:1), the yield was 5.8 per cent. The various lots of resin were assayed by the U. S. P. XI assay method for determination of the percentage of resin in podophyllum. Taking the average of several determinations, the resin prepared with the U. S. P. alcohol was found to assay 99.7 per cent resin, while the resin prepared with a mixture of 9 volumes of alcohol and 1 volume of water assayed 98.2 per cent resin.

DISCUSSION OF RESULTS.

It was found that the two menstrua extract resin of podophyllum at practically the same rate. The alcohol-water mixture gave a slightly higher yield of resin, but according to assay results, the product was not as pure as that obtained by the use of the U. S. P. alcohol.

Since the yields of resin were 5.4% and 5.8%, respectively, while the drug assayed 7.41% resin, a loss of resin in the process of precipitation and washing is indicated.

The menstruum of alcohol 9 volumes—water 1 volume gave a slightly higher yield of resin, but the product was not as pure as that obtained by using alcohol as the menstruum. These results are in accord with the results of Husa and Fehder in similar investigations of the extraction of jalap and ipomea (1), (2).

SUMMARY.

Alcohol and alcohol-water mixture (9:1) extract the resin from podophyllum at practically the same rate. The alcohol-water mixture (9:1) gives a slightly higher yield of resin of podophyllum; however, the product is less pure than that obtained by use of alcohol. On the basis of purity of product, it is concluded that alcohol is preferable to alcohol-water mixture for the preparation of resin of podophyllum.

REFERENCES.

(1) Husa, W. J., and Fehder, P., Jour. A. Ph. A., 26, 121 (1937).
(2) Husa, W. J., and Fehder, P., *Ibid.*, 26, 319 (1937).

A COMPARATIVE STUDY OF TWO SHORT ACTING BARBITURIC ACID DERIVATIVES.*

BY EDWARD E. SWANSON AND WILLIAM E. FRY.[1]

In previous communications (1), (2), (3), (4), (5), (6), (7), the pharmacological properties of two short acting barbituric acid derivatives, "Sodium Amytal" (Sodium Iso-amyl Ethyl Barbiturate, Lilly) and "Seconal" (Sodium Propyl-methyl-carbinyl Allyl Barbiturate, Lilly), were reported. It was concluded that "Seconal" had a shorter duration of action and that its minimal anesthetic dose (M. A. D.) and minimal lethal dose (M. L. D.) were smaller than those of "Sodium Amytal."

In the present experiments, a more extensive comparison of these two barbituric acid compounds was made in all available experimental animals. Frogs, mice, rats, guinea pigs, rabbits, cats, dogs and monkeys were used. The frogs weighed from 17 to 29 Gm., or an average of 20 Gm.; mice, 10 to 18 Gm. (average 14 Gm.); rats, 68 to 132 Gm. (average 95 Gm.); guinea pigs, 251 to 361 Gm. (average 295 Gm.); and rabbits, 1345 to 2032 Gm. (average 1663 Gm.). Solutions of the sodium salts of the compounds were injected. In frogs, the drugs were administered in the ventral lymph sac. In mice, rats, guinea pigs and rabbits, the barbituric acid derivatives were given by vein, intraperitoneally, or subcutaneously. Monkeys were injected only by vein and cats only intraperitoneally. The minimal anesthetic dose (M. A. D.), duration of action of the M. A. D., and the minimal lethal dose (M. L. D.) were determined by using five animals for each dose level.

As shown in Table I, in all the animals the M. A. D. and M. L. D. of "Seconal" are distinctly smaller than those of "Sodium Amytal." With the exception of mice, "Seconal" also has a shorter duration of action than "Sodium Amytal." In mice, however, the results are reversed; that is, "Sodium Amytal" is distinctly shorter (almost half) than "Seconal." No explanation can be given for this discrepancy. As the size of the animal increases, the duration of action of "Seconal" decreases in comparison with "Sodium Amytal," until in cats, dogs and monkeys, the duration of "Seconal" is one-half or less than one-half that of "Sodium Amytal."

TABLE I.—COMPARISON OF TWO SHORT ACTING BARBITURIC ACID DERIVATIVES.

Species of Animal.	Number of Animals Used.	Method of Administration.	"Sodium Amytal" M. A. D. Mg. per Kg.	"Sodium Amytal" Average Duration of Action of M. A. D. Minutes.	"Sodium Amytal" M. L. D. Mg. per Kg.	"Seconal" M. A. D. Mg. per Kg.	"Seconal" Average Duration of Action of M. A. D. Minutes.	"Seconal" M. L. D. Mg. per Kg.
Frogs	92	Ventral lymph sac	70	600	110	50	480	90
		Intravenous	80	60	200	50	112	130
Mice	312	Intraperitoneal	120	99	260	60	172	140
		Subcutaneous	130	114	280	70	208	160
		Intravenous	60	111	135	30	90	80
Rats	350	Intraperitoneal	80*	174	180*	40	144	110*
		Subcutaneous	110	240	230*	60	200	140*
		Oral	225	676	400	65	500	125

* Scientific Section, A. PH. A., New York meeting, 1937.

[1] From the Lilly Research Laboratories, Indianapolis, Indiana.

		Intravenous	55	216	90	17.5	144	35
Guinea pigs	177	Intraperitoneal	60	240	120	20	210	40
		Subcutaneous	85	282	170	30	270	60
		Intravenous	50	200	80	20	120	45
Rabbits	50	Intraperitoneal	60	270	120	30	140	50
		Subcutaneous	70	300	150	50	155	90
Cats	35	Intraperitoneal	70	800	120	35	350	75
		Intravenous	45	920	75*	25*	443	50*
Dogs	300+	Oral	70	1340	125*	40	644	90*
		Rectal	100		200*			
Monkeys	10	Intravenous	40*	80*		17.5	40	

* Published previously (1), (2), (3), (4), (5), (6), (7).

CONCLUSIONS.

1. A more extensive comparative study of two short acting barbituric acid derivatives has been made.

2. In all animals, "Seconal" has a distinctly smaller M. A. D. and M. L. D. than "Sodium Amytal."

3. Except in mice "Seconal" has definitely a shorter duration of action than "Sodium Amytal."

4. As the size of the animal increases, the duration of action of "Seconal" diminishes more significantly than that of "Sodium Amytal."

REFERENCES.

(1) Swanson and Shonle, *J. Pharmacol.*, 41, 289 (1931).
(2) Swanson, *J. Lab. Clin. Med.*, 17, 325 (1932).
(3) Swanson, *J. Pharmacol.*, 46, 387 (1932).
(4) Shonle, Keltch, Kempf and Swanson, *Ibid.*, 49, 393 (1933).
(5) Swanson, *J. Lab. Clin. Med.*, 18, 933 (1933).
(6) Swanson, Weaver and Chen, *Am. J. Med. Sci.*, 193, 246 (1937).
(7) Swanson, *Proc. Soc. Exptl. Biol. Med.*, 32, 1563 (1935).

SOLARGENTUM SOLUTIONS—STABILITY ON AGING.*

BY F. N. VAN DERIPE, R. A. KONNERTH AND R. E. SCHOETZOW.[1]

It has been common practice to require that solutions of the U. S. P., Mild Silver Proteins, such as Solargentum, be made up fresh just prior to use and to recommend that the solution be used only while reasonably fresh. Due to the fact that none of our observations on Solargentum had ever disclosed anything which would contra-indicate the use of solutions other than fresh ones, storage tests were made in an effort to find differences between fresh and aged solutions. Differences were not found in experiments extending over a year and at least in the case of Solargentum it is not necessary that the solutions be used only when fresh.

* Scientific Section, A. PH. A., New York meeting, 1937.

[1] Analytical Department of the Chemical and Pharmaceutical Laboratories, E. R. Squibb & Sons, Brooklyn, N. Y.

In a preliminary experiment covering a period of eight weeks, two, five, ten, twenty and fifty per cent solutions of Solargentum, Lot M53289, were stored in flint glass bottles exposed to diffused daylight, but not to sunlight, and examined critically each week. There was practically no change in the physical appearance of the solutions; they continued to have their characteristic bright, rich black color throughout the eight weeks. Very little sediment or suspended matter could be detected even by centrifuging portions of the solutions. In weekly irritation tests the more dilute solutions were dropped into the eye, and all the solutions were applied to the nostril and tongue; no change in sensation was observed—in fact, no real irritation was observed, only a momentary faint sting in the eyes, which was the same with the old solutions as with fresh ones.

These products are made using gelatin as the protective colloid. Although that material is hydrolyzed prior to use, it seemed possible that during the aging of solutions of the Silver Protein the gelatin hydrolysis might proceed still further and thereby alter, perhaps reduce, its effectiveness in maintaining a good colloidal dispersion. It was thought that such changes would be accompanied by changes in the viscosity of the solution. However, tests showed that viscosity changes did not occur. Instead of recording the results of the weekly tests, only those obtained on fresh and on eight-week-old solutions will be given. The viscosity was measured as the time of flow from a 25-cc. standard volumetric pipette No. 371, the solution having a temperature of 25° C.

	Fresh Solutions.	Solutions Eight Weeks Old.
2%	30 seconds	30 seconds
5%	31 seconds	30 seconds
10%	31 seconds	31 seconds
20%	33 seconds	33 seconds
50%	75 seconds	71 seconds

Only the 50% solution shows any change and it is doubtful that, in this case, the four-second difference between 75 seconds and 71 seconds has any significance considering the method of measurement.

In view of these findings a more elaborate and longer experiment was conducted in which 1000-cc. portions of fifteen per cent solutions of each of three Solargentums, M60339, M60452 and M61173, were prepared and set aside in five approximately equal portions, in amber glass bottles, at room temperature. At intervals these solutions were compared with freshly made solutions for appearance and for sediment by centrifuge test, but no definite differences were observed. Finally, the aged solutions were compared with freshly made ones by both chemical and biological means. The chemical comparison was made when the solutions were thirteen months old and the biological comparison when they were sixteen months old.

As before, no difference was discernible in the appearance of the old and freshly made solutions. On centrifuging slightly more sediment was obtained from the old solutions, but the amount obtained in either the old or new solution was slight—not more than 0.1 cc. from a 50-cc. portion.

The p_H determinations were made using the glass electrode. The results, tabulated below, show that during aging the p_H decreases slightly, but we judge that the lower p_H should still be considered satisfactory, if no change in irritation or germicidal action had also occurred.

Solargentum Number.	p_H of Old Solution.	p_H of New Solution.
60339	8.53	9.52
60452	8.48	9.15
61173	8.15	9.33

The change in p_H was confirmed by titrations showing slight decreases in alkalinity. It was found that the solutions could be titrated using Phenolphthalein T.S. if 10 cc. of the solution were diluted with 100 cc. of a mixture of equal parts of alcohol and ether, and the precipitated matter removed by filtration.

Solargentum Number.	Cc. *N*/10 Sodium Hydroxide Required.	
	Aged Solution.	Fresh Solution.
60339	1.11 cc.	0.36 cc.
60452	1.16 cc.	0.50 cc.
61173	0.83 cc.	0.42 cc.

Activity tests were made using the regular cup test method. The findings are as follows:

Solargentum Number.	Clear Zone.	
	Aged Solution.	Fresh Solution.
60339	9 mm.	10 mm.
60452	8 mm.	9 mm.
61173	9 mm.	10 mm.

The differences noted above in activity between the sixteen-month-old and the new solutions are slight and in agreement with data obtained from other types of tests made in isolated experiments which prompted the making of these storage tests.

Irritation tests were made by applying the solutions to the eyes of rabbits and did not demonstrate any significant increase in irritation in the aged solutions taken as a whole. The results indicated that the probability of significant difference between the fresh and old solutions of any one of the samples was very slight. Out of twenty-three direct comparisons of fresh and old solutions ten tests showed no difference between the fresh and old solutions, five tests showed slightly more irritation with the fresh solution, and eight tests showed slightly more irritation with the old solution. In each test 0.5 cc. of the aged 15% solution or of a 7.5% solution made by dilution of the aged solution was instilled into one eye of the rabbit and the corresponding fresh solution, at the same concentration of course, was installed into the other eye. The duration of treatment varied from one to five and one-quarter hours. The eyes of the rabbits were washed out with saline solution prior to the making of the tests.

These experiments demonstrate, we believe, that solutions of Solargentum can be used safely and without loss of effectiveness for a considerable time after they have been prepared.

The activity and animal irritation tests were made in the Biological Research Laboratories of E. R. Squibb and Sons and their assistance in this work is gratefully acknowledged.

INVESTIGATION OF THE FRUIT OF SAMBUCCUS CALICARPA.*

BY RICHARD H. COOK AND FOREST J. GOODRICH.

Sambuccus Calicarpa, a species of elder indigenous to the Pacific Northwest, has elicited local unestablished statements that the conspicuous red fruit of the plant is poisonous. Just how such rumors started or from where they emanated is uncertain, but the fruits from this plant so far as is known, are never used in medicine. Since the flowers of two species of Sambuccus are official in the National Formulary, and since the fruits of these species are used as food for man, it seemed that a scientific investigation of the fruit and its components was worth while. It was thought that the chemical composition might throw some light upon the reputed toxicity, along with pharmacological experiments on animals, using freshly gathered materials and extracts.

Sambuccus calicarpa is a shrub or small tree 8–20 feet high; leaves thin, pubescent beneath with short oppressed hairs above. The leaflets are oblong-ovate, accuminate, sharply serrate to the very apex and 2–7 inches long. The flowers are cream colored in racemes 2–5 inches across and very showy. The fruit is scarlet, but occasionally yellow or chestnut colored.

According to Piper (1) this plant is also known under the species name of *S. pubens* and *S. leiosperma* and under the variety name of *S. racemosa arborescens*.

From a survey of the literature, the only chemical investigation made on this plant was an analysis of the expressed fixed oil of the fresh fruit by Byers and Hopkins (2) at the University of Washington. They state that the fruit of the above species was not used for wines or food because of its unpleasant odor and taste. The results of their analysis were:

Palmitin	22.0%	Linoleic	7.8 %
Olein and linolein	73.6%	Caprinin, caproin and caprylin	3.0 %
Oleic acid	92.0%	Unsaponified residue	0.66%

The latter component was a yellow crystalline mass with a peculiar odor. Constants on the oil were determined and reported as follows:

Saponification number	209.3	Reichert-Meissl number	1.5
Iodine number	8.44	Free fatty acid	4.65
Hehner value	91.75		

The above constants were observed to approximate those of olive oil.

EXPERIMENTAL.

The fruit used in the investigation was obtained on Mercer Island, the University of Washington Campus and vicinities adjacent to Seattle.

Several samples of the ground whole fruit were air-dried and lost approximately 75% of their weight. The pericarp was removed from the seed of the fresh fruit and both this and the seed were ground and dried.

Selective extractions were performed on dried samples of both the pericarp and seed meal. One set of extractions was made using new dried samples for each solvent and another set carried out using the same samples for all solvents. Following are the results:

---

* Scientific Section, A. PH. A., Dallas meeting, 1936.

PERICARP.

Solvent.	Using New Samples in Duplicate. Mean Wt. Sample (Gm.).	Mean Wt. Extract.	Mean % Extract.	Using Same Sample in Duplicate. Mean Wt. Sample (Gm.).	Mean Wt. Extract.	Mean % Extract.
Pet. Ether	5.0	1.2849	25.69	20.0	5.1320	25.66
Eth. Ether	5.0	1.3012	26.02	..	0.2000	1.00
Eth. Alc.	5.0	2.2915	45.83	..	2.7485	13.74
Water	5.0	2.8948	57.9	..	7.9662	39.83
$CHCl_3$	5.0	1.5446	30.89	..	....	...
Acetone	5.0	1.6084	33.61	..	....	...
		Seed Meal.				
Pet. Ether	10.0	3.2150	32.15	20.0	4.2920	21.46
Eth. Ether	10.0	3.3610	33.61	..	2.4200	12.10
Eth. Alc.	10.0	4.4210	44.21	..	2.0067	10.03
Water	10.0	1.1515	11.52	..	1.8020	9.10
$CHCl_3$	10.0	3.7370	37.37	..	....	...
Acetone	10.0	3.6310	36.31	..	....	...

From the relatively large percentages of fixed oil obtained from the pericarp and seed meal were observed:

(*a*) The pericarp oil was an orange-yellow *non-drying* oil, while the seed oil was an amber-colored drying oil.

(*b*) The rapid conversion upon standing of the seed oil to a thick, viscous product.

(*c*) Deposition of white fatty materials from both oils, particularly abundant from the pericarp oil.

(*d*) Extremely unpleasant taste and odor of both oils.

(*e*) Intense red color alcohol extracts of the oils.

VOLATILE OIL.

Three thousand grams of the fresh fruit were steam distilled and gave a yield of 0.2795 Gm. of oil or 0.009 per cent. Upon standing a few days at 10° C., white needle-shaped crystals were deposited in the volatile oil. The purified crystals had a melting point of 122° C. After reduction, a benzaldehyde odor developed and tests indicated that the crystals were benzoic acid.

Ash:		Minerals in Fruit:	
From pericarp	9.55% green colored	Manganese	0.0015%
From seed	3.25% reddish brown	Iron	0.0020%
Acid-Insoluble Ash:		Alkaloids	Negative
From pericarp	0.65%	Saponins	Positive
From seed	0.32%	Pectins	3.47%
Alkalinity of Ash:		Malic and tartaric acid	3.12%
From pericarp	0.360	Tannic acid	2.94%
From seed	0.460	Reducing sugars	7.42%

Constants for the non-drying fixed oil of the pericarp and the drying oil of the seed were made.

CONSTANTS.

	Non-Drying Fixed Oil of Pericarp.	Drying Fixed Oil of Seed.
Specific gravity	0.9210	0.9245
$[\alpha]_D^{25°}$	1.4713	1.4788
Iodine value (Hanus)	83.11	187.7
Saponification number	201.2	198.7
Soluble fatty acids	7.10%	4.1%
Hehner number	92.02	94.2

	Non-Drying Fixed Oil of Pericarp.	Drying Fixed Oil of Seed.
Reichert-Meissl number	1.22	1.31
Polenske number	0.98	0.87
Solid fatty acids	23.7%	12.4%
Liquid fatty acids	75.1%	86.2%
Free fatty acids (as oleic)	6.19%	5.72%
Unsaponifiable residue	0.70%	0.61%
Elaidin test	Weak	Strong

Investigation of the unsaponifiable residues from both fixed oils indicated that it was largely phytosterol.

TOXICOLOGICAL.

Six albino rats were fed the ground air-dried fruit, each receiving 5 Gm. per Kg. of body weight daily. Along with this they were given a sustaining diet of ground semolina and scratch food. A seventh rat was used as a control omitting the elder fruit from the food. The following table indicates the changes in weight.

Rat.	Weight 1st Day.	Amt. Fruit Eaten in 20 Days.	Weight at End of 20 Days.	Weight Change in Gm.
1	195 Gm.	19.5 Gm.	197 Gm.	2.0 Gm.
2	200 Gm.	20.0 Gm.	200 Gm.	0.0 Gm.
3	222 Gm.	22.2 Gm.	220 Gm.	−2.0 Gm.
4	225 Gm.	22.5 Gm.	225 Gm.	0.0 Gm.
5	187 Gm.	18.7 Gm.	188 Gm.	1.0 Gm.
6	202 Gm.	20.2 Gm.	203 Gm.	1.0 Gm.
7	211 Gm.	Control	210 Gm.	−1.0 Gm.

The data show that the rats suffered no ill effects from the 20-day feeding.

Two small dogs with an average weight of 5.5 Kg. were given a mixture of equal parts of canned dog food and the ground fruit. A third dog of approximately the same weight was used as a control and fed the same brand of dog food. The two test animals each consumed 250 Gm. of the air-dried fruit daily for seven days. No variations could be noted in the appearance of the three dogs which was conclusive evidence that the fruit lacks toxicity to the animals.

BIBLIOGRAPHY.

(1) Wehmer, C., *Phlanzenstoffe*, 742–744 (1911).
(2) Kunz, H., *Arch. Pharm.*, 223, 704 (1885).
(3) Winckler, F. L., *Ibid.*, 74, 208 (1840).
(4) Muller, Joseph, *Ibid.*, 95, 153 (1846).
(5) Gladstone, J. H., *J. Am. Chem. Soc.*, 74, 1 (1864).
(6) Guignard, M. L., *Compt. rend.*, 141, 1193 (1905).
(7) Sachs, F., and Tollens, B., *Ber.*, 37, 4115 (1904).
(8) Wittman, J., *Z. landw. Versuchsst.*, 4, 131 (1901).
(9) Blass, M., *Brandes Arch.*, 4, 347 (1823).
(10) Kramer, H., *Arch. Pharm.*, 93, 20 (1845).
(11) Malmejac, F., *J. Pharm. Chim.*, 14, 17 (1901).
(12) Simon, E., *Ann. Pharm.*, 31, 261 (1839).
(13) Haensel, H., *Ber., Chem. Abstr.*, 5, 897 (1911).
(14) Guignard, M. L., *Wehmer's Phlan.*, 742–743, note 13, nr. 2186 (1911).
(15) Moeller, J., *Pharm. Post*, 113 (1895).
(16) Sando, C. E., and Lloyd, J. N., *J. Biol. Chem.*, 58, 737–745 (1924).
(17) Alpers, W. C., PROCEEDINGS A. PH. A., 48, 190 (1900).
(18) Lyons, Frank F., *Am. J. Pharm.*, 64, 1–3 (1892).
(19) Metzger, J. B., *Ibid.*, 53, 553–554 (1881).
(20) Traub, C. G., *Ibid.*, 53, 392–393 (1881).

(21) Moosbrugger, C. Otto, *Am. J. Pharm.*, 67, 520 (1895).
(22) Greger, J. Z., *Nahr. Genussm.*, 42, 383 (1921).
(23) Nowack, G., and Zellner, J., *Monatsh.*, 42, 293–310 (1922).
(24) Mathes, H., and Rossie, W., *Arch. Pharm.*, 256, 284–288 (1918).
(25) Thoms, H., *Ber.*, 29, 598–627 (1919).
(26) Byers, H. G., and Hopkins, P., *J. Am. Chem. Soc.*, 24, 771 (1902).
(27) Nowack, G., and Zellner, J., *Br. Yrbk. of Pharm.*, 207–208 (1923).
(28) Nowack, G., *Z. angew. Chem.*, 29, 1, 337–338 (1916).
(29) Bourquelot, E., and Danjou, E., *Pharm. Post*, 351 (*Compt. rend.*) (1906).
(30) Zellner, J., *J. Soc. Chem. Ind.*, 37, 519A (1918).
(31) Kostychev, S. P., *Chem. of Plant Phys.*, 232–254 (1877).
(32) Thatcher, R. W., *Chem. of Plant Life*, 152, 82–86 (1872).
(33) Seddon, H. R., and King, R. O. C., *J. Counc. Sci. and Ind. Research*, 3, 14–24 (1930).
(34) Thoms, Hermann, *Pharm. J.*, 102, 34 (1919).
(35) Frye, T. G., and Rigg, G. B., *N. W. Flora*, 365 (1914).
(36) Piper, C. V., "Flora of Wash.," 530–531 (1906).
(37) Gray, A., "*Gamopetalæ*," 278 (1885).
(38) Jepson, W. L., "Man. of Flow. Plants of Cal.," 965 (1867).
(39) Thoms, Hermann, *Jarherb. der Pharm.*, 54, 326–327 (1919).
(40) Pammel, L. H., "Man. of Poisonous Plants" (1862).
(41) Hohm, Theo., *Merck's Reports* (October 1909).
(42) Lemoine, G., *Am. J. Pharm.*, 62, 597 (1890).
(43) Bridel, M., and Arnold, R., *Compt. rend.*, 172, 1434 (1921).
(44) Rosenthaler, L., "The Chem. Invest. of Plants" (1875).
(45) Karrer, P., and Widmer, R., *Pharm. J.*, 65, 231 (1927).
(46) Piesse, Septimus, *Am. J. Pharm.*, 26, 367 (1854).
(47) Solon, M. Martin, *Ibid.*, 5, 176 (1833–1834).
(48) Allen, John C., *Ibid.*, 5, 208 (1833–1834).
(49) Howell, Thomas, "Flora of N. W. Am.," 1, 277 (1903).
(50) Palmer, Edward, *Am. J. Pharm.*, 50, 543 (1878).

THE VALUE OF A PHARMACEUTICAL MUSEUM.

The plea that the new building of the Society should contain a room specially set apart as a museum is one to which most pharmacists are likely to respond. We all admit that pharmacy owes a great deal to the past; the point was emphasized by Dr. Sprague in his talk on "Early Herbals," and one's thoughts naturally turn to the many interesting pharmaceutical relics which are still scattered up and down the country. Old invoices, prescription books and accounts may have some historical value. I recently read some advertisements drawn up by druggists over 100 years ago, and was impressed by the little changes which subsequent years have introduced. There was the same claim made for a remedy for all ailments, and the same appeal to the fear of the sufferer; in fact, with a little alteration in the language one advertisement might have been incorporated in a broadcast advertisement of the present day. Photographs of old-established pharmacies, many of which are being pulled down, or refitted with new shop fronts, would form an interesting collection. So, too, would a file of old-fashioned labels for medicinal proprietaries. To study pharmacy as it was practiced some seventy years ago would be a liberal education; and might help the modern generation to realize something of the dignity and respect which was attached to the pharmacist of a bygone age.—From *The Pharmaceutical Journal* (British).

"TAXATION VERTICAL *VS.* HORIZONTAL."*

BY JAMES C. CARSTATER.

From the dawn of history to the year of 1830 A. D. the majority of gainful occupation was engaged in agricultural pursuits. In the United States in the year 1830 approximately 70% of gainful occupation was agricultural. During the century from 1830 to 1930 A. D. a great transition evolved. The transition with especial reference to taxation and economics was that agricultural ratio of gainful occupation decreased to 21%.

Inversely as agricultural ratio of gainful employment decreased, the ratio of other vocations increased. Thus, whereas 100 years ago, other than agricultural vocations were $^3/_7$ as great as agricultural, to-day the other vocations are four (4) times as great as agriculture. Therefore taking the physical volume of food we eat as a yardstick of comparison (and not granting that present-day sanitation and vitamin therapy have added value to our food), we find that other than agricultural vocations have gained ten and $^6/_{10}$ times in the past 100 years.

When we look around to-day and realize that at the dawn of the twentieth century we could not spend our money for moving pictures, radios, automobiles, aeroplanes or aeroplane rides, phonographs, electric refrigerators, etc.; when we realize that electrification was in its infancy, as was sanitary plumbing, that bread was baked in the home by wood or coal fire, it does not take much thought to reach the conclusion that approximately 50% of present-day consumable commodities were not in existence in the year 1900.

Simultaneously, with the sequence of agricultural transformation an emphatic tendency also took place in which the following conditions have become factual realities:

(1) A greater variety of consumable commodities on the market. Thus a higher living standard, due to a greater selection and variety of enjoyable commodities.

(2) Migration of population reducing rural density, and inversely increasing metropolitan density and creating smaller cities.

(3) An ever-increasing ratio of population who are specialists.

(4) A decreasing ratio of our population who understand our modern economic order.

For two basic reasons:

A. Since a specialist concentrates on one thing, his mind first becomes saturated with the present available knowledge of his subject, then he continues to add research to his subject. Thus he gets to know less about the economics of the world at large. His very research, however, tends to further complicate the general understanding and while one specialist is doing this in one line, other specialists are also doing it in other lines.

B. Since no specialist's vocation constitutes a majority of our gainfully employed population. It therefore is apparent that the reason people of years ago were more understood in their economic order was because 70% were in the same vocation of agriculture.

---

* Section on Commercial Interests, A. PH. A. meeting, New York, August 1937.

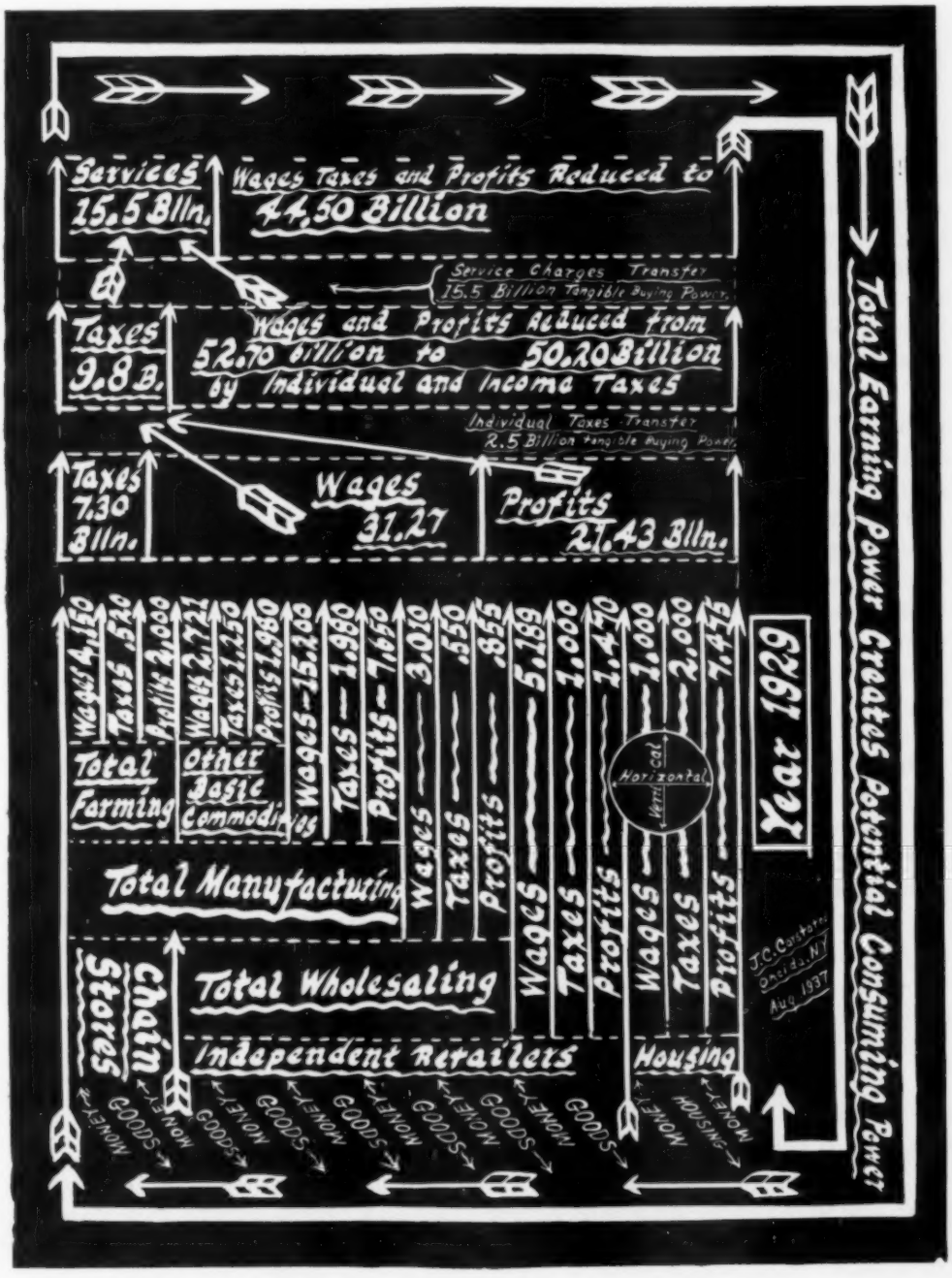


Fig. 1.—Transportation, communications, etc., are not confined to any economic division. Insurance dividends, Government bond earnings, and bank earnings and deposit interest are considered as holding companies. The profits in this chart include these items as definite earnings of equities in national wealth.

It is also apparent in observing the foregoing tendencies that consumable goods as created to-day no longer have a direct relationship with land value. Consumable goods as produced to-day are composed of an ever-increasing ratio of the human ingredient of specialized skill, specialized science and specialized education.

Thus from a former state of a horizontal enterprise known as agriculture our modern economic order of specialization has brought about a vertical procedure in which consumable goods start at the mine, field or forest as basic commodities. From here they go to the factory to be fabricated into commodities of use. Then through the wholesale and retail distributing agencies to the ultimate consumer. The following chart is thus descriptive of our approximate economic status for the year of 1929.

Referring to the foregoing chart and starting at the bottom, we exchange our money as consumers for merchandise or house rent. Since all goods sold at retail must be replaced from the factory, the chart shows how the chains buy direct at factory while the independent merchant buys at the wholesale distributor. Then we find the manufacturers buy from the basic commodity enterprises. Each of these enterprises, however, deduct their money to pay their help, money to pay taxes and money to pay for the invested capital. Thus collective spending creates collective income. Next we find that after this income representing 21.43 billion of profits, 31.27 billion as wages and salaries, and 7.30 billion as taxes, the government again taps you on the shoulder for 2.5 billion, for individual income taxes, dog taxes, automobile registration and licenses, fishing and hunting licenses, etc. Thus this tax reduces the profits and wages from an aggregate amount of 52.70 billion dollars to 50.20 billion. Next we find that service charges of a personal nature such as nurses, house maids, chauffeurs, physicians, dentists, ministers of the gospel, Salvation Army and other miscellaneous service vocations account for 15.50 billion dollars, and they cause the 60 billion dollar tangible buying income to shrink from 60 billion to 44.50 billion.

On this chart you will see the various elements of national income. The tangible buying income is approximately 60 billion dollars and the service charge income included is 78 billion dollars. The value of goods consumed by individuals in their respective vocations can be placed at any figure or value and cannot be disputed. Thus some claim the 1929 income is from 90 to 100 billion dollars.

To consider income as including services and consumed values not entering into the money cycle, may be all right. But, on the other hand, how can taxes be collected on such a basis?

For instance, a man may earn $5000 a year and hire a house girl at $500 a year; this would create an annual income of $5500 a year. Another man may be married. He may also earn $5000 a year and allow his wife to help him spend the money. Thus in each instance the tangible buying power is the same.

Since there is no practical way to apply taxation on service charges, the author has reached the conclusion that the broadest practical base of a scientific tax system is the tangible sales of consumable commodities, including house rent value as a commodity. From the standpoint of taxation ratio of 1929 to these various tax bases, the following ratios are about right:

Based on services, local consumption and monetary exchange of 90 billion dollars the ratio would be..... 10.8%
Based on services and revenues from tangible sales of 78 billion dollars the ratio would be..... 12.6%
Based on employment in manufacture and distribution of tangible sales of 60 billion dollars the ratio would be..... 16.3%

Aside from the argument on taxation, we find in our present economic order a battle between the horizontal or craft union and the vertical or industrial union. We find a battle between the investment of capital in horizontal structures and in vertical structures or holding companies. We find a battle between the chain store (which is a vertical distributing agency from factory to consumer) and the independent merchant and jobber who are horizontal distributing agencies.

One fact stands out. The more hands a commodity passes through from basic commodity to consumer, the less each handler receives of the retail price. And the more times it turns over, the greater ratio of tax it bears. Thus in our transformation from a horizontal structure of 100 years ago to our present economic order of vertical procedure, we are still wrestling with a hodgepodge of taxation that is opposed to further expansion of specialization, civilization or the modern economic order.

In operating a business, what must we do to succeed? We must take in more money than we spend. All taxes whether local, state or federal, are a portion of our overhead and must be recaptured in the price we obtain for any commodity that we sell.

What about capital wealth? Does taxation on capital wealth reach the consumer? The answer is simple. Your capital wealth is worth exactly what it produces in consumable goods. Thus a tax on capital is either confiscation of the capital, if the tax is not passed on, or else the tax is an ingredient in the consumable commodity created.

What does this all lead to? It leads to the fact that all taxes are a portion of the price we pay for the commodities we buy and consume at retail, including the commodity of housing.

After we reach the conclusion that consumable commodities bear all taxes, what else do we find? We find that as specialization has increased, turnover has increased, thus finished retail commodities through the factory and jobber and retailer, change hands many times. Since taxes to-day are business overheads, the oftener an item turns over, the more taxation it bears.

As an illustration, suppose a factory produces an item to sell at $1.00 retail and the factory price is 60 cents. If a chain buys the item no extra sales effort or overhead is involved except sale to the ultimate consumer. Suppose the warehousing is 3%. If a jobber buys the item, he must be centrally located so as to compete with other jobbers. He must exert sales effort and overhead, including taxes, to again sell the retailer. Suppose his overhead is 11%. When we remember that the 1929 taxation ratio to tangible sales volume was 16.3% it is plain to see that the chain stores' savings in tax on the same commodity is about 2%. With a 2% price advantage, if other things are equal, you should get about 50% more business volume. If you get 50% greater volume of sales you reduce your overhead,

including taxation. At the same time, the business you capture from your competitor increases his overhead in ratio to sales volume which includes taxation.

Within the past few years we have witnessed fair trade legislation, Robinson-Patman legislation and the Miller-Tydings bill. Is not equalization of competition the essence of these legislative necessities?

If we create legislation that governs the buying and selling of the goods we handle and at the same time ignore a discrimination in tax ratio for the handling of the same goods, then we are actually ignoring the basic cause of the great differential in cost of consumer goods to the public.

In 1929, retail sales totaled 49.114 billion dollars, in 1933, 25.037 billion dollars, or 50.9% of the former figure. Wholesale turnover in 1929 was 69.291 billion dollars, in 1933 it was 32.030 billion dollars, or 46.2% of the former figure. Chain store sales in 1929 were 21.9% of all sales, and in 1933 were conservatively estimated at 25% of all sales. Do not the actual findings of the Department of Commerce show that what the chain store captured of the distribution field was at the expense of the jobber?

In 1929 the *value of the products* of all manufacturers was 69.960 billion dollars, in 1933 it was 31.358 billion dollars or 44.8% of the former figure. In 1929, the *value added* by manufacturer was 31.785 billion dollars, and in 1933 it was 14.610 billion dollars, or a decrease of 45.96%. Thus in the manufacturing field the discrimination against turnover in favor of the vertical holding company is also apparent. In the census reports of 1935 both chain stores and holding companies have shown a slackening because of penalizing efficiency by a hodgepodge of special taxes that have no definite aim or uniformity of purpose.

There seems to be no escape from the fact that the fairest method of taxation would be a sales tax based on the retail price of all consumable commodities, the tax to be applied in most instances at the manufacturing source.

Suppose a 50¢ item bore a 10¢ tax or 20 per cent. If a store sold the item at 40¢ it would be paying 25% tax and the store selling at 50¢ would be paying a 20% tax. The result would be just the opposite of what we are experiencing to-day.

When we realize that the Federal budget has not been balanced in seven years, what about the future when they do balance the budget?

Passing more tax laws creates more government jobs to enforce them and creates more jobs for business to support to dodge them or keep them to a minimum. Thus the two forces counterbalance each other, add expense to commodities and create no added value whatsoever.

If we tax the wealthy, and they still remain wealthy, then the poor are still paying the taxes. If we tax the wealthy and they become poor, then we have to look around for another set of tax laws.

As pharmacists, we cannot stand in the road of the economic tendencies of a greater specialization and a higher living standard.

As pharmacists, we are retailers, as retailers, we are the present and the future tax collectors. In a nutshell, the future support of government should embrace the following three points:

1. Elimination of the vertical drag on turnover.
2. Horizontal application of a sales tax on consumable commodities, including housing.
3. Coördination of Federal, state and local tax systems.

LOCAL BRANCHES

BALTIMORE.

The November meeting, Baltimore Branch, A. PH. A., was held on Thursday evening, November 18th, School of Pharmacy Building, University of Maryland, at 8:15 P.M., and was well attended.

Dr. W. H. Hartung, who recently joined the staff of teachers at the University of Maryland, was guest speaker, his subject being, "Value of Research in Pharmacy." He was given a hearty welcome as a member of the Branch.

At the conclusion of the meeting refreshments were served.

ROBERT S. FUQUA, *Secretary.*

NEW YORK.

The regular meeting of the New York Branch, A. PH. A., was held Monday evening, October 11th, at Columbia University College of Pharmacy. President F. C. A. Schaefer presided, and about 100 members and guests were present.

The minutes of the May meeting were approved; the Treasurer's report showed a balance of $364.51.

Letters were read from Dr. H. C. Christensen, secretary of the N. A. B. P., Dr. Robert L. Swain and Dr. George D. Beal, making favorable comment on and thanking the Branch for various features of the past convention.

On motion of Dr. Schaefer a committee on Queries was appointed with Dr. R. P. Fischelis as chairman, and the letters were referred to him.

On motion of Dr. H. Schaefer, seconded by Dr. Wimmer, a committee consisting of Drs. Canis, Schaefer and Piccoli was appointed to draft resolutions on the death of Dr. Jacob Diner.

Dr. Herman Sharlit, Dr. Frederick Williams and Dr. Anton Hogstad addressed the members. After considerable discussion, a rising vote of thanks was accorded the speakers and the meeting adourned.

HORACE T. F. GIVENS, *Secretary.*

NOVEMBER.

The November meeting of the New York Branch was held on Monday, the 8th, at Columbia University, College of Pharmacy. About 130 members and guests were present, President Schaefer presiding. The minutes of the October meeting were read. The minutes of the special meeting held October 25th, on the occasion of presenting the 1937 Remington Medal to Dr. J. Leon Lascoff, were approved. The report of the Committee in charge of the Lascoff Dinner was received and the Committee discharged, with thanks.

Resolutions on the death of Dr. Jacob Diner were read and ordered spread on the minutes and a copy sent to Mrs. Diner.

Mr. Joseph Kalish spoke on "Emulsions;" a paper by Robert A. Kramer on "Modern Emulsifiers," was read by Mr. Elmer B. Tisdale; and Mr. Francis Chilson spoke on "Emulsification Equipment." A rising vote of thanks was accorded the speakers, after which the meeting adjourned.

HORACE T. F. GIVENS, *Secretary.*

NORTHERN NEW JERSEY.

The first meeting of the year, 1937–1938, of the Branch, was held at the Rutgers University College of Pharmacy, Monday, November 15th.

Mr. William L. Sampson, of Merck & Co., gave an informal discussion of "Sulfanilamide." He reviewed the history, chemistry, uses, posology and pharmacology of this chemical and of closely allied chemicals. Emphasis was placed on the fact that a derangement of kidney function retards the elimination of the sulfanilamide and that since diethylene glycoll impairs the action of the kidneys, there is grave danger in the use of these two chemicals together. The fact that several deaths have recently been reported as having been caused by such a combination emphasizes the necessity for more careful control over new preparations before placing them on the market.

C. L. COX, *Secretary.*

PHILADELPHIA.

The November meeting of the **Philadelphia Branch, A. PH. A.**, was held Tuesday evening, November 9th, at Temple University. Minutes of the October meeting were read.

Two new members were received.

Mr. Ambrose Hunsberger, chairman of the Committee on Revision of the Constitution and By-Laws, read a report of the proposed changes.

President Kendig asked the members to rise for a moment in tribute to Dr. Henry K. Mulford, who for many years was active in the affairs of the A. PH. A. and the Philadelphia Branch. It was moved and seconded that a committee be appointed to draw up a suitable expression of regret on the demise of Dr. Mulford.

Dr. R. L. Swain spoke on "Recent Fair Trade Legislation and What It Will Mean to the Pharmacist." Discussion followed, led by Dr. R. P. Fischelis. A rising vote of thanks was accorded the speaker.

Mr. Hunsberger moved that the Branch extend an invitation to the N. A. R. D. to meet in Philadelphia in 1938, after which the meeting adjourned.

ARTHUR K. LEBERKNIGHT, *Secretary*.

PITTSBURGH.

The November meeting of the Pittsburgh Branch, A. PH. A., was held on the 16th, at the Falk Clinic, Mr. Gordon M. Sleigh presiding. Committee appointments for the year were announced.

The speaker of the evening was Dr. I. Hope Alexander, Director of Public Health, Pittsburgh, who spoke concisely on "Diptheria," "Pulmonary Diseases" and the "Social Scourges." Dr. Alexander emphasized the fact that public health problems are an essential part of the pharmacist's program, and invited pharmacists to become interested in the work of his department.

FRANK S. MCGINNIS, *Secretary*.

CITY OF WASHINGTON.

The monthly meeting of the Branch was held on Monday evening, October 18th, at the AMERICAN INSTITUTE OF PHARMACY, President Briggs presiding. Minutes of the previous meeting were read and approved.

Dr. McCloskey, Senior Pharmacologist of the Pure Food and Drug Administration, spoke on "Survey of U. S. P. XI and N. F. VI Biological Assays," pointing out the methods of the different assays of the various drugs and the changes that have been made from the previous revisions.

Mr. K. L. Kelly, Research Associate at the National Bureau of Standards, read a paper on "Color Names for Pharmaceuticals." With the aid of charts and exhibits, Mr. Kelly gave a very comprehensive explanation of the standardization of color names.

Dr. S. L. Hilton, the next speaker, had for his subject, "The Lives of H. E. Kalusowski and M. I. Wilbert." Dr. Hilton, who was a very dear friend of both, brought out the fine characters and achievements of the two gentlemen. During the discussion that followed, various members of the Branch added to the fine remarks of Dr. Hilton.

Dr. Kebler spoke on "The Life of Dr. H. W. Wiley." The former, who worked with Dr. Wiley, gave a very interesting descriptive picture of the character and achievements of the man who was responsible for the enactment of the Pure Food and Drug Act.

Mr. Warren, chairman of the Program Committee, moved that the Branch hold a dinner meeting during the coming year, and the motion was passed. Dr. Briggs stated that he would appoint a committee to make the necessary arrangements.

V. B. NORELLI, *Secretary*.

NOVEMBER.

The monthly meeting of the Branch was held on Monday evening, November 15th, at the AMERICAN INSTITUTE OF PHARMACY, Dr. Briggs presiding. The minutes of the previous meeting were read and approved.

The president introduced Dr. James F. Couch, of the Department of Agriculture, who gave a splendid lecture on the "Native Poisonous Plants." Dr. Couch illustrated his lecture by means of slides.

During the discussion that followed, Mr. V. K. Chestnut, a pioneer in the research of poisonous plants, and author of "The Thirty Original Poisonous Plants," added to the remarks of Dr. Couch.

It was voted that the December meeting be held on the second Monday of the month and the program for the meeting was announced.

Mr. Fuller brought to the attention of the Branch the recent deaths that have occurred in the several states from the use of the so-called Elixir of Sulfanilamide. Means of curbing such preparations from the market were discussed but the Branch took no definite action.

V. B. NORELLI, *Secretary.*

UNIVERSITY OF MISSISSIPPI STUDENT BRANCH.

The first meeting, 1937–1938, was held early in October. Plans for organization were discussed. President Day addressed those present on "The Accomplishments of the Association" and "Why You Should Become a Member."

The next meeting was held on Thursday, October 28th, in the Pharmacy Auditorium. Dean E. L. Hammond was the principal speaker. His topics were, "National Pharmacy Week" and "The 1937 A. PH. A. and A. A. C. P. Conventions in New York City," following which several students spoke:

Mercer Hayne, "The Advance of Science;" Bless Rusk, "Knockout Drops;" Louis Begin, "Immunization." A Round Table discussion of the three subjects was led by Dean E. L. Hammond.

BLESS RUSK, *Secretary.*

SOCIETIES AND COLLEGES.

On January 31 to February 2, 1938, inclusive, the **University of Minnesota** will offer its second Pharmaceutical Institute to be held in the University's Center for Continuation Study. These Institutes offer to registered pharmacists in Minnesota an opportunity to take "refresher" courses and also to avail themselves of information about the most recent advances in the professional field.

The Center for Continuation Study, a new University project, now in its second year, offers the opportunity for post-graduation study. The building of the Center for Continuation Study is especially adapted to this type of education in that it includes luxurious living accommodations, dining facilities, car storage and lecture room.

The monthly meeting and initiation of the **Pittsburgh Graduate Chapter of Kappa Psi Pharmaceutical Fraternity** was held November 18th.

Several appointments to the teaching staff of the **College of Pharmacy, Columbia University** were recently announced by Dean Ballard. These additions are necessitated by the adoption of a program for the Bachelor's degree in Pharmacy, which at the same time, permits full credit being given by Columbia University to the courses taken by the student in the pharmacy school.

The **Alumni of Columbia University** held its annual dinner on November 10th, and with but few exceptions there were representatives of the classes from 1876 to 1937. Dean Ballard addressed the members, after which dancing was an enjoyable feature.

The **University of Buffalo, School of Pharmacy** inaugurated the four-year course at the beginning of the school year, with the usual decline in enrollment, due to increase in requirements.

The **Midtown Dental Society of New York City** held its first meeting October 21st at Hotel Pennsylvania, with about three hundred members present.

The **British Pharmaceutical Society** has announced the appointment of **Mr. H. Berry,** B.Sc., Ph.C., A.I.C., as Dean of the School of Pharmacy, to succeed Professor J. H. Burns who served as Dean since Professor Greenish retired in 1933, and who resigned recently to become Professor of Pharmacology in Oxford University.

Mr. Berry has been Vice-Dean since 1933, when he came to the School from the Birmingham Technical College where he had been head of the Department of Pharmacy since it was established in 1927.

The October issue of the *Alumni Review,* **University of Pittsburgh,** carries an article on "Education and Pharmacy" by Dean C. Leonard O'Connell of the School of Pharmacy, which is the second in a series of articles by the deans of the University, explaining the broad

aims of their schools, and how their programs carry out the general program of the University.

It is proposed to develop a Pharmaceutical Museum in the headquarters building of the **Pharmaceutical Society of Great Britain** which is soon to be erected.

In proposing that the pharmacists of the Irish Free State should organize as a guild, the retiring President of the **Pharmaceutical Society of Ireland** said that the existing Pharmacy Acts and the powers given to the Council of the Society were altogether inadequate to protect a profession giving service to the community and that "The duties of the pharmacists are out of all proportions to the rights they enjoy."

The annual meeting of the **National Drug Trade Conference** was held in the Mayflower Hotel, Washington, D. C., on Tuesday, December 7th. Drs. George D. Beal, R. P. Fischelis and E. F. Kelly represented the A. PH. A.

The following items were considered: Report of the Committee to Prepare a Table of Potent and Toxic Drugs; Report of the Committee on State Narcotic Acts; Report of the Councilor to U. S. Chamber of Commerce; Report of the Committee on Endowment; Report of the Committee on General Status of Pharmacy and the Drug Trade; Report of the Committee on Information Regarding Distribution of Drugs and Medicines; Report on New York World's Fair; National Legislation; Report of the Committee on the Status of Pharmacy in National and State Public Health Programs.

Messrs. Carson P. Frailey, A. C. Taylor and Rowland Jones, Jr., were reëlected as President, Vice-President and Secretary-Treasurer, respectively, for 1937–1938.

OBITUARY.

F. GLADSTONE HINES.

Mr. Hines, who was prominent in pharmaceutical affairs in Great Britain for many years, died on November 1st, following an operation. American and Canadian pharmacists will recall his visit to Toronto as President of the Pharmaceutical Society of Great Britain, to attend with other officials of the Society, the joint meeting of the Canadian and AMERICAN PHARMACEUTICAL ASSOCIATIONS in 1932. He and the other British friends contributed greatly to the success of the meeting and Mr. Hines was elected an Honorary Member of the Association at that time.

Mr. Hines was born in Ipswich, fifty-six years ago, served his apprenticeship there and graduated from the College of the Pharmaceutical Society in 1902. Except for a short time spent in the employ of Burroughs, Wellcome & Co., he spent his life in retail pharmacy. He was very active for many years in the Pharmaceutical Society; was a member of the Council from 1917 to 1925; was vice-president from 1930 to 1932; and served as president for the year 1932–1933. A forceful man of strong convictions, Mr. Hines differed widely with the other members of the Council about the plans for the Society's new headquarters, but his record is one of helpful service to the Society and to pharmaceutical advancement.

F. G. FRICKE.

F. G. Fricke, aged 91, oldest active druggist in Nebraska, died at his home at Plattsmouth, the latter part of October.

A past-president of the State Pharmaceutical Association, he was a familiar figure at state conventions of that organization. Before coming to Plattsmouth he operated drug stores in St. Louis, Mo., Mound City, Ill., Richmond, Va., and Ashland, Nebr. He is survived by three sons and two daughters.

Mr. Fricke joined the A. PH. A. in 1903 and the membership was continued until his death.

MAJOR C. B. RUPPE.

Major Charles Bernard Ruppe, aged 74, died November 17th, at his home in Albuquerque, where he had been in the drug business for fifty-seven years. He was the oldest practicing pharmacist in New Mexico. Major Ruppe came to Albuquerque in 1880. He was born in New York City, and was educated in Heidenfelts German-American Institute. He was apprenticed to a pharmacist at the age of fourteen.

Major Ruppe was interested in the civic enterprises of his city. He joined the first militia company organized in Albuquerque, which was in 1882. He was appointed a captain in 1903, and major in 1906. He saw service with the Pershing expedition into Mexico and later in the World War. He was a member of the New Mexico legislature in 1907. He was chief of the early volunteer fire department in Albuquerque and was the first Exalted Ruler of the Albuquerque lodge of Elks, a past Chancellor of the Knights of Pythias, and president of the New Mexico State Board of Pharmacy.

Major Ruppe was a member of the A. PH. A. from 1908, and took an acitve interest in its work.

EDITORIAL NOTES

THE PROCEEDINGS NUMBER.

IN ISSUING the proceedings of its annual meeting in one number of the JOURNAL, November 1937, the ASSOCIATION has taken another important step in rearranging its publication program with the object of making its publications more useful.

The Proceedings Number carries in its approximately 300 pages, an abstract of the transactions of the AMERICAN PHARMACEUTICAL ASSOCIATION, including the General Sessions, Council, House of Delegates and Sections; American Association of Colleges of Pharmacy; National Association Boards of Pharmacy; Plant Science Seminar; National Conference of Pharmaceutical Research; Conference of Pharmaceutical Association Secretaries; and Conference of Pharmaceutical Law Enforcement Officials. Addresses and Reports before these bodies are either given in full or in condensed form and there are dozens of them. Papers, of which there are many, have been or will be printed in other numbers of the JOURNAL during the year, with an abstract of any discussion of them. This compilation provides a compact review of the work of the organizations which deal with professional and scientific pharmacy.

In addition, the Proceedings Number carries the ASSOCIATION data heretofore printed in the YEAR BOOK, including the Constitution and By-Laws, Code of Ethics, Lists of Past and Present Officers, Treasurer's Report for 1936, with full information about funds, and a List of Members, and a complete roster of national and state associations. The Proceedings Number is a valuable reference volume and should be in every pharmaceutical library.—E. F. K.

(2) SUB-SECTION ON PHARMACY.

The Executive Committee of this Sub-Section, composed of: Dean R. A. Lyman, *Chairman*, Dean W. F. Rudd and Dr. Glenn L. Jenkins, has arranged the following program for the meeting of the Sub-section on Monday morning, December 27th, in the Antlers Hotel, Indianapolis, Ind., during the annual meeting of the American Association for the Advancement of Science. The Sub-section will also hold a General Session with the Section on Medical Sciences.

1. "The Assay of Mydriatic Drugs," Alice Hayden, C. B. Jordan and H. G. DeKay, School of Pharmacy, Purdue University, La Fayette, Ind.

2. "Homologs of Salol. The Salicylates of Isomeric Amyl Phenols and Amyl Cresols," H. G. Kolloff, J. O. Page and M. C. Hart. The Upjohn Laboratories, Kalamazoo, Mich.

3. "The Chemical Constitution and the Physiological Activity of the Latex of Ficus pumila L." Conrado F. Asenjo. University Club, Madison, Wis.

4. "A Study of the Toxic Principles of Red Squill," Floyd J. LeBlanc. Division of Pharmacy, South Dakota State College, Brookings, S. Dak.

5. "Gelsomicine, Aconitine or Pseudaconitine: Which Is the Most Toxic Alkalcid?" K. K. Chen, Robert C. Anderson and E. Brown Robbins. The Lilly Laboratories, Indianapolis, Ind.

6. "Daphnia—Indicator and Dosimeter in Microphysiology," Arno Viehoever, Philadelphia College of Pharmacy and Science, Philadelphia, Pa.

7. "Mechanism of Action of Alpha Naphthylisothiocyanate—a New Organic Insecticide," A. Viehoever and N. Tischler, Philadelphia College of Pharmacy and Science, Philadelphia, Pa.

8. "Enteric Coatings," J. T. Goodley and C. O. Lee, School of Pharmacy, Purdue University, La Fayette, Ind.

9. "The Problems Involved in the Radiographic Study of Enteric Coatings," F. Scott Bukey, College of Pharmacy, University of Nebraska, Lincoln, Neb.

10. "The Effect of Peptone on the Resistance of Staphyloccoccus Aureus," George F. Reddish and Ella Burlingame, St. Louis College of Pharmacy, St. Louis, Mo.

11. "Fluorescence Analysis of Some Alkaloids and Crude Drugs," A. Slesser and C. B. Jordan, Purdue University, School of Pharmacy, La Fayette, Ind.

12. "The Determination of Volatile Oil in Vegetable Drugs," Elmer H. Wirth, School of Pharmacy, University of Illinois, Chicago, Ill.

13. "Chemical Analysis of the Common Milkweed," A. E. Rihn and H. G. DeKay, School of Pharmacy, Purdue University, La Fayette, Ind.

The A. PH. A. will again be represented in The Science Exhibit at this meeting.

PERSONAL AND NEWS ITEMS.

Editor E. G. Eberle, of the JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, is making good progress and is now able to be at his office in the AMERICAN INSTITUTE OF PHARMACY, each day. We welcome his return.

Dr. James H. Beal, of Cocoa, Fla., an outstanding figure in American Pharmacy, was acting president of the American Druggists' Fire Insurance Company for some months during 1937, to fill the vacancy caused by the death of Charles H. Avery.

Dean and Mrs. W. F. Gidley, of the School of Pharmacy, University of Texas, were injured in an automobile accident on October 9th. Both are making satisfactory progress.

A testimonial dinner honoring **Dr. Hugh C. Muldoon,** dean of Duquesne University's School of Pharmacy, was tendered to him on November 23rd. Dr. Muldoon recently was named president of the American Association of Colleges of Pharmacy. The banquet committee was comprised of deans of various Duquesne schools and colleges; and the president of Duquesne University, Rev. J. J. Callahan, and Dr. George D. Beal, of Mellon Institute, were among the speakers.

Mr. Lynn P. Stout, a graduate of the Philadelphia College of Pharmacy and Science, 1921, now living in Charlottesville, Va., was a recent visitor and donated an ancient hand scale, with a set of cup weights, for the Historical Museum.

Dr. S. L. Hilton, proprietor of a Professional Pharmacy in Washington, D. C., donated to the Library, "Perfumes, Cosmetics and Soaps," by Wm. A. Poucher, in two volumes.

Dr. J. C. Munch, Professor of Pharmacology at the School of Pharmacy, Temple University, Philadelphia, Pa., delivered a lecture at Fordham University, College of Pharmacy, on November 9, 1937, on "Researches on Inorganic Medicinals."

The Philadelphia College of Pharmacy and Science has announced the receipt of two research grants, one of these is a fellowship established by Merck & Co., and the other is a graduate fellowship established by Dr. Joseph Rosin.

The Alumni Association of the St. Louis College of Pharmacy presented an engrossed Resolution, on Friday, November 26th, to Governor Stark of Missouri, at Jefferson City, in appreciation of his personal interest and leadership in the statute recently enacted relating to the registration of pharmacists.

Dr. Hugo H. Schaefer was tendered a largely attended dinner and dance at the Hotel Pennsylvania, New York City, on the evening of November 21st, in testimony of his election as Dean of the Brooklyn College of Pharmacy. Mr. Nicholas S. Gesoalde was chairman of the Dinner Committee and Mr. George R. Christ served as toastmaster. The speakers were Harland H. Horner, Associate Commissioner for Higher Education, University of New York, Tristram Walker Metcalfe, Dean, Long Island University, Robert R. Gerstner, a lifelong friend; and Dr. Curt P. Wimmer, representing Dr. H. V. Arny, who could not be present.

Dr. Schaefer served as local secretary of the recent meeting of the Association in New York and of the meeting there in 1919.

Dr. H. M. Burlage, of the School of Pharmacy, University of North Carolina, Chapel Hill, has been elected as chairman of the Pharmaceutical Syllabus Committee to succeed Dr. J. G. Beard who requested to be relieved of the Chairmanship. Dr. Burlage has been for some time acting chairman of this Committee, which is composed of seven representatives each from the A. PH. A., A. A. C. P. and the N. A. B. P.

Mr. J. M. Miller, Vacaville, Calif., has retired, after having spent fifty-six years in the practice of Pharmacy.

Mr. Thomas Roach, of Oklahoma City, was recently elected Moderator of the Oklahoma City Presbytery and this is the first time a layman has been so honored in many years.

Mrs. Henry F. Hein, of San Antonio, Texas, was elected as President of the Woman s Organization of the N. A. R. D., at the recent St. Louis meeting.

Dr. W. J. Danforth, Secretary of the Texas Pharmaceutical Association, and Commander of the Texas Department of the American Legion, was tendered a testimonial dinner by his friends on Friday, October 8th, at the Blackstone Hotel in Ft. Worth.

Founders' Day exercises marking the anniversary of the one hundredth year of the **Medical College of Virginia,** Richmond, were held on Tuesday, December 7th. Sir Austin H. Clark, Director of Press Service, American Association for the Advancement of Science, spoke on "Science in Colonial Virginia." The college will celebrate its Centennial during the current season.

AMERICAN PHARMACEUTICAL ASSOCIATION OFFICIAL ROSTER FOR 1937-1938

(Committees will be corrected as appointments are made by the President, Chairman of the Council, Chairman of the House of Delegates, and Chairmen of the Sections.)

OFFICERS OF THE ASSOCIATION.

President, E. N. Gathercoal, Chicago, Ill.
Honorary President, H. G. Ruenzel, Milwaukee, Wis.
First Vice-President, W. Mac Childs, Eldorado, Kans.
Second Vice-President, Glenn L. Jenkins, Minneapolis, Minn.
Secretary, E. F. Kelly, 2215 Constitution Ave., Washington, D. C.
Treasurer, C. W. Holton, Box 81, Essex Fells, N. J.
Editor of the Year Book, A. G. DuMez, Lombard & Greene Sts., Baltimore, Md.
Editor of the Journal, E. G. Eberle, 2215 Constitution Ave., Washington, D. C.

THE COUNCIL.

Elected Members.—James H. Beal, Fort Walton, Fla. (1938); R. L. Swain, 2411 N. Charles St., Baltimore, Md. (1938); C. H. LaWall, 214 S. 12th St., Philadelphia, Pa. (1938); H. C. Christensen, 130 N. Wells St., Chicago, Ill. (1939); R. P. Fischelis, 28 W. State St., Trenton, N. J. (1939); Ernest Little, 1 Lincoln Ave., Newark, N. J. (1939); H. A. B. Dunning, Charles & Chase Sts., Baltimore, Md. (1940); S. L. Hilton, 1033–22nd St., N. W., Washington, D. C. (1940); P. H. Costello, Cooperstown, N. Dak. (1940).

Ex-Officio Members.—E. N. Gathercoal; George D. Beal; W. Mac Childs; G. L. Jenkins; E. F. Kelly; C. W. Holton; E. G. Eberle; A. G. DuMez; A. L. I. Winne.

OFFICERS OF THE COUNCIL.

Chairman, S. L. Hilton; *Vice-Chairman*, George D. Beal; *Secretary*, E. F. Kelly.

COMMITTEES OF THE COUNCIL.

Committee on Finance.—*Chairman*, R. L. Swain; H. A. B. Dunning; C. W. Holton.

Committee on Property and Funds.—*Chairman*, E. N. Gathercoal; C. W. Holton; S. L. Hilton; R. L. Swain; E. F. Kelly.

Committee on Publications.—*Chairman*, A. G. DuMez, R. P. Fischelis; C. H. LaWall; Ernest Little; E. G. Eberle, E. F. Kelly; A. G. DuMez; C. W. Holton.

Committee on Standard Program.—*Chairman*, S. L. Hilton; W. F. Rudd; E. F. Kelly; J. C. Munch; J. C. Krantz, Jr.

Committee on N. F. and R. B. Policies.—George D. Beal, Ernest Little, E. F. Kelly. *Ex-Officio*, E. N. Gathercoal, E. F. Cook, J. Leon Lascoff.

Committee to Develop Advertising for the R. B. and N. F.—*Chairman*, J. Leon Lascoff, H. A. B. Dunning, R. P. Fischelis.

Committee to Confer with Representatives of the U. S. P. Board of Trustees.—*Chairman*, E. N. Gathercoal, E. F. Kelly, George D. Beal.

Committee on Pharmacy Week Policies.—*Chairman*, R. P. Fischelis, A. L. I. Winne, Glenn L. Jenkins.

Representatives on The American Council on Pharmaceutical Education.—E. F. Kelly (1938); H. A. B. Dunning (1940); D. F. Jones (1942). These members serve with an equal number from the A. A. C. P. and the N. A. B. P.

Committee on A. Ph. A. Laboratory.—*Chairman*, E. N. Gathercoal, Geo. D. Beal, E. Fullerton Cook, Joseph Rosin, J. C. Krantz, Jr. *Ex-Officio Members*, S. L. Hilton, E. F. Kelly.

THE HOUSE OF DELEGATES.

Officers of the House.—*Chairman*, A. L. I. Winne, Richmond, Va.; *Vice-Chairman*, Ernest Little, Newark, N. J.; *Secretary*, E. F. Kelly, Washington, D. C.

COMMITTEES OF THE HOUSE OF DELEGATES.

Place of Meeting.—*Chairman*, W. F. Rudd, Richmond, Va.; R. A. Lyman, Lincoln, Nebr.; C. G. Merrell, Cincinnati, O.; Arthur D. Baker, Denver, Colo.; W. H. Glover, Lawrence, Mass.

THE SECTIONS.

Scientific Section.—*Chairman*, B. V. Christensen, Gainesville, Fla.; *First Vice-Chairman*, C. F. Lanwermeyer, Waukegan, Ill.; *Second Vice-Chairman*, J. M. Dille, Seattle, Wash.; *Secretary* (three years), F. E. Bibbins, Indianapolis, Ind.; *Delegate to the House of Delegates*, Glenn L. Jenkins.

Committee on Ebert Prize.—*Chairman*, P. A. Foote, Gainesville, Fla.; L. W. Rowe, Detroit, Mich.; W. G. Crockett, Richmond, Va.

Board of Review of Papers.—*Chairman*, F. E. Bibbins, Indianapolis, Ind. (1941); R. E. Terry, Chicago, Ill. (1942); Carl J. Klemme, La Fayette, Ind. (1942); H. M. Burlage, Chapel Hill, N. C. (1941); W. G. Crockett, Richmond, Va. (1940); E. V. Lynn, Boston, Mass. (1940); C. O. Lee, West Lafayette, Ind. (1939); L. W. Rising, Seattle, Wash. (1939); L.W. Rowe, Detroit, Mich. (1938); Heber W. Youngken, Boston, Mass. (1938).

Committee on Monographs.—*Chairman*, E. E. Swanson, Indianapolis, Ind.; A. H. Uhl, Madison, Wis.; Marvin J. Andrews, Baltimore, Md.; W. G. Christiansen, Brooklyn; L. E. Harris, Norman, Okla.

Section on Education and Legislation.—*Chairman*, George A. Moulton, Peterborough, N. H.; *Vice-Chairman*, John F. McCloskey, New Orleans, La.; *Secretary*, A. O. Mickelsen, Portland, Ore.; *Delegate to House of Delegates*, George C. Schicks.

Section on Practical Pharmacy and Dispensing.—*Chairman* W. J. Husa, Gainesville, Fla.; *First Vice-Chairman*, L. W. Richards, Missoula, Mont.; *Second Vice-Chairman*, R. W. Clark, Madison, Wis.; *Secretary*, Louis C. Zopf, Iowa City, Iowa; *Delegate to the House of Delegates*, H. A. K. Whitney.

Subsection Hospital Pharmacy.—*Chairman*, J. Solon Mordell, Syracuse, N. Y.; *Secretary*, S. W. Morrison, Chicago, Ill.

Section on Pharmaceutical Economics.—*Chairman*, Henry F. Hein, San Antonio, Texas; *Vice-Chairman*, Paul C. Olsen, Philadelphia, Pa.; *Secretary*, Joseph H. Goodness, Boston, Mass.; *Delegate to the House of Delegates*, Frank A. Delgado.

Section on Historical Pharmacy.—*Chairman*, E. J. Ireland, Gainesville, Fla.; *Secretary*, Will T. Bradley, Boston, Mass.; *Historian*, E. G. Eberle, Washington, D. C.; *Delegate to the House of Delegates*, Loyd E. Harris.

STANDING AND SPECIAL COMMITTEES OF THE ASSOCIATION.

Elected by the Council.

Committee on National Formulary.—*Chairman*, E. N. Gathercoal, Chicago, Ill.; *Vice-Chairman*, Louis Saalbach, Pittsburgh, Pa.; *Secretary*, Adley B. Nichols, Philadelphia, Pa.; Gustav Bachman, Minneapolis, Minn.; H. A. Langenhan, Seattle, Wash.; Paul S. Pittenger, Philadelphia, Pa.; Wilbur L. Scoville, Detroit, Mich.; E. H. Wirth, Chicago, Ill.; H. V. Arny, New York, N. Y.; Bernard Fantus, Chicago, Ill.; Leonard Seltzer, Detroit, Mich.; E. L. Newcomb, New York, N. Y.; S. L. Hilton, Washington, D. C.; I. A. Becker, Chicago, Ill.; Glenn L. Jenkins, Minneapolis, Minn. *Associate Member*, the Chairman of the Revision Committee, U. S. P.

Committee on Recipe Book.—*Chairman*, J. Leon Lascoff, New York City; I. A. Becker, Chicago, Ill.; C. J. Clayton, Denver, Colo.; E. F. Cook, Philadelphia, Pa.; M. G. de Navarre, Detroit, Mich.; Bernard Fantus, Oak Park, Ill.; R. P. Fischelis, Trenton, N. J.; Alice-Esther Garvin, New Haven, Conn.; E. N. Gathercoal, Chicago, Ill.; Wm. H. Glover, Lawrence, Mass.; Wm. Gray, Chicago, Ill.; L. D. Havenhill, Lawrence, Kans.; S. L. Hilton, Washington, D. C.; W. W. Horne, Fayetteville, N. C.; H. Evert Kendig, Philadelphia, Pa.; J. Leon Lascoff, New York City; Charles E. McCormick, Baltimore, Md.; George A. Moulton, Peterborough, N. H.; J. C. Munch, Lansdowne, Pa.; C. Leonard O'Connell, Pittsburgh, Pa.; Thomas Roach, Oklahoma City, Okla.; George C. Schicks, Newark, N. J.; J. K. Thum, Philadelphia, Pa.; C. P. Wimmer, New York City.

Committee on Pharmaceutical Research.—James C. Munch, Lansdowne, Pa. (1941); H. W. Youngken, Boston, Mass. (1941); John C. Krantz, Jr., Baltimore, Md. (1940); W. L. Scoville, Detroit, Mich. (1940); W. J. Husa, Gainesville, Fla. (1939); Geo. D. Beal, Pittsburgh, Pa. (1939); H. V. Arny, New York City (1938); C. H. LaWall, Philadelphia, Pa. (1938); Glenn

(Continued from page xi)

L. Jenkins, Minneapolis, Minn. (1937); J. A. Koch, Pittsburgh, Pa. (1937). *Associate Members*, E. F. Cook, Philadelphia, Pa.; E. N. Gathercoal, Chicago, Ill.; E. F. Kelly, Washington, D. C.; C. W. Holton, Essex Fells, N. J.

Committee on Proprietary Medicines.—*Chairman*, Roy B. Cook, Charleston, W. Va.; R. P. Fischelis, Trenton, N. J.; R. L. Swain, Baltimore, Md.; F. A. Delgado, Washington, D. C.; A. L. I. Winne, Richmond, Va.; W. B. Day, Chicago, Ill.; Hugo H. Schaefer, New York City.

Appointed by the President.

Committee on the Study of Pharmacy.—*Chairman*, R. P. Fischelis, Trenton, N. J.; E. F. Kelly, Washington, D. C.; R. A. Lyman, Lincoln, Neb.; F. A. Delgado, Washington, D. C.; Harvey A. Whitney, Ann Arbor, Mich.

Committee on Cosmetics.—*Chairman*, H. C. Muldoon, Pittsburgh, Pa.; A. G. DuMez, Baltimore, Md.; Ralph E. Terry, Chicago, Ill.; Bernard Fantus, Chicago, Ill.; Maison Gabriel de Navarre, Detroit, Mich.; F. W. Nitardy, Brooklyn, N. Y.

Committee on Local and Student Branches.—*Chairman*, Ernest Little, Newark, N. J.; N. T. Chamberlin, Cleveland; R. L. Puls, Cincinnati; C. V. Netz, Minneapolis; H. J. Donnell, Portland, Ore.; R. E. Terry, Chicago; A. K. Leberknight, Philadelphia; Bernard A. Bialk, Detroit; Robert S. Fuqua, Baltimore; H. T. F. Givens, New York; V. B. Norelli, Washington, D. C.; Frank S. McGinnis, Pittsburgh; C. L. Cox, Newark; Masaru Masuko, Los Angeles; Peggy Kreizinger, San Francisco; R. H. Weaver, Gainesville; Belle Wenz Dirstine, Pullman, Wash.; Hal Acuff, Louisville; Isabelle Seissman, Brooklyn; Bless Rusk, University, Miss.

Board of Canvassers.—*Chairman*, C. Leonard O'Connell, H. C. Muldoon, Robert W. Gaw—all of Pittsburgh, Pa.

Committee on Legislation.—*Chairman*, E. F. Kelly, 2215 Constitution Ave., Washington, D. C.; R. P. Fischelis, Trenton, N. J.; S. L. Hilton, Washington, D. C.; R. L. Swain, Baltimore, Md.; Rowland Jones, Washington, D. C.

Committee on U. S. Pharmacopœia.—*Chairman*, Elmer H. Wirth, Chicago, Ill. (1946); L. F. Kebler, Washington, D. C. (1938); Arthur P. Markendorf, Louisville, Ky. (1939); Frank O. Taylor, Detroit, Mich. (1940); Arno Viehoever, Philadelphia, Pa. (1941); Harry E. Bischoff, Union City, N. J. (1942); H. Evert Kendig, Philadelphia, Pa. (1943); C. C. Glover, Ann Arbor, Mich. (1944); Arthur F. Schlichting, St. Louis, Mo. (1945); Wm. J. Husa, Gainesville, Fla. (1947).

Committee on Pharmaceutical Syllabus.—*Chairman*, R. A. Lyman, Lincoln, Neb. (1943); H. M. Burlage, Chapel Hill, N. C. (1938); H. C. Muldoon, Pittsburgh, Pa. (1939); Emerson D. Stanley, Madison, Wis. (1940); E. Fullerton Cook, Philadelphia, Pa. (1941); E. R. Serles, Brookings, S. Dak. (1942); Glenn L. Jenkins, Minneapolis, Minn. (1944). *These members serve with an equal number from the N. A. B. P. and the A. A. C. P. each.*

Committee on Pharmacy Week.—*Chairman*, Anton Hogstad, Jr., c/o Merck & Co., Rahway, N. J.; Edward Spease, Cleveland, Ohio; John H. Hoagland, New Brunswick, N. J.; John O'Brien, Omaha, Neb.; Roy J. Warnack, Los Angeles, Calif.; L. M. Kantner, Baltimore, Md.; E. J. Ireland, Gainesville, Fla.

Committee on Horticultural Nomenclature.—*Chairman*, H. W. Youngken, Boston, Mass.; C. W. Ballard, New York, N. Y.; E. N. Gathercoal, Chicago Ill.

Committee on Physiological Testing.—*Chairman*, James C. Munch, 40 N. Maple Ave., Lansdowne, Pa.; Wm. T. McCloskey, Washington, D. C.; L. W. Rowe, Detroit, Mich.; C. A. Morrell, Ottawa, Can.; E. E. Swanson, Indianapolis, Ind.; M. R. Thompson, Baltimore, Md.; H. B. Haag, Richmond, Va. *This committee reports in full to the Scientific Section and in abstract to the House of Delegates.*

Committee on Weights and Measures.—*Chairman*, M. N. Ford, Columbus, Ohio; R. P. Fischelis, Trenton, N. J.; W. Mac Childs, Eldorado, Kans.; A. C. Taylor, Washington, D. C.; Arthur D. Baker, Denver, Colo.; T. W. Hoskins, Louisville, Ky.; the Chairman of the Section on Practical Pharmacy and Dispensing and of the Committee on Prescription Tolerances, Ex-Officio. *This committee reports in full to the Section on Practical Pharmacy and Dispensing and in abstract to the House of Delegates.*

Committee on William Procter, Jr., Memorial Fund.—*Chairman*, James E. Hancock, Baltimore, Md.; A. R. L. Dohme, Baltimore, Md.; B. T. Fairchild, New York, N. Y.; E. G. Eberle, Washington, D. C.; D. M. R. Culbreth, Baltimore, Md.; Henry T. Hopkins, Keyport, N. J.; W. B. Day, Chicago, Ill.; Ivor Griffith, Philadelphia, Pa.; J. K. Lilly, Indianapolis, Ind.; Charles G. Merrell, Cincinnati, Ohio; José P. Alacan, Havana, Cuba; R. L. Quigley, Washington, D. C.

Committee on Lay Press Relations.—*Chairman*, R. W. Rodman, Bloomfield, N. J.; H. C. Christensen, Chicago, Ill.; W. A. Hamor, Pittsburgh, Pa.; E. F. Kelly, Washington, D. C.; Ernest Little, Newark, N. J.; J. C. Munch, Lansdowne, Pa.; R. L. Swain, Baltimore.

Committee on Endowment Fund.—*Chairman*, Wm. B. Day, Chicago, Ill.; C. O. Bigelow, New York, N. Y.; Chas. E. Vanderkleed, Philadelphia, Pa.; F. W. Sultan, St. Louis, Mo.; F. J. Wulling, Minneapolis, Minn.

The American Institute of Pharmacy Maintenance Committee.—*Chairman*, H. A. B. Dunning, Chase and Charles, Baltimore, Md.; E. F. Kelly, Washington, D. C.; R. L. Swain, Baltimore, Md.; S. L. Hilton, Washington, D. C.; R. P. Fischelis, Trenton, N. J.; George D. Beal, Pittsburgh, Pa.

Committee on Pharmacists in the Government Service.—*Chairman*, H. E. Kendig, Philadelphia, Pa.; B. Tappan Fairchild, New York City; F. L. McCartney, Chicago, Ill. Also three each to be appointed by the N. A. B. P. and A. A. C. P.

International Pharmaceutical Federation.—*Delegates*, E. F. Cook, Philadelphia, Pa.; E. F. Kelly, Washington, D. C.; *Reporters*, E. G. Eberle, Washington, D. C.; Otto Raubenheimer, Brooklyn, N. Y.; John C. Krantz, Jr., Baltimore, Md.

American Association for the Advancement of Science.—*Councilors*, E. F. Kelly, Washington, D. C.; Rufus A. Lyman, Lincoln, Nebr.

National Drug Trade Conference Delegates.—Geo. D. Beal, Pittsburgh, Pa.; R. P. Fischelis, Trenton, N. J.; E. F. Kelly, Washington, D. C.

Committee on Prescription Tolerances.—*Chairman*, W. J. Husa, Gainesville; S. L. Hilton, Washington, D. C.; R. E. Terry, Chicago; M. J. Andrews, Baltimore; P. H. Costello, Cooperstown, N. Dak.; I. W. Rose, Chapel Hill, N. Car.; A. O. Mickelsen, Portland, Ore. *This committee reports in full to the Section on Practical Pharmacy and Dispensing and in abstract to the House of Delegates.*

Committee on Professional Relations.—*Chairman*, Leonard A. Seltzer, Detroit, Mich.; C. B. Jordan, La Fayette, Ind.; George M. Beringer, Camden, N. J.; K. B. Bowerman, San Francisco, Calif.; Roland T. Lakey, Detroit, Mich.—*An Auxiliary Committee of one member from each state will be appointed.*

Committee on Modernization of Pharmacy Laws.—*Chairman*, R. L. Swain, Baltimore; Robert C. Wilson, Athens, Ga.; Arthur D. Baker, Denver; E. J. Prochaska, Pine City, Minn.; S. H. Dretzka, Milwaukee.

Committee on Council on Pharmaceutical Practice.—*Chairman*, E. F. Cook, Philadelphia, Pa.; H. V. Arny, New York City; P. H. Costello, Cooperstown, N. Dak.; E. N. Gathercoal, Chicago, Ill.; Robert R. Gaw, Pittsburgh, Pa.; C. B. Jordan, La Fayette, Ind.; E. F. Kelly, Washington, D. C.; Edward Spease, Cleveland, Ohio; R. L. Swain, Baltimore, Md.; L. A. Seltzer, Detroit, Mich.; H. A. K. Whitney, Ann Arbor, Mich.

Committee to Study Courses in History of Pharmacy.—*Chairman*, C. O. Lee, La Fayette, Ind.; E. J. Ireland, Gainesville, Fla.; Loyd Harris, Norman, Okla. *This committee reports in full to the Section on Historical Pharmacy and in abstract to the House of Delegates.*

Committee on Dental Pharmacy.—*Chairman*, Geo. C. Schicks, Newark; Leslie Ohmart, Boston; Lewis G. Freeman, Buffalo; A. O. Mickelsen, Portland, Ore.; C. Leonard O'Connell, Pittsburgh; Ralph E. Terry, Chicago; M. J. Andrews, Baltimore.

GENERAL MEMBERSHIP COMMITTEE.

Chairman, E. F. Kelly, 2215 Constitution Ave., Washington, D. C. *The Chairman, at his discretion, may appoint an auxiliary committee of one member from each state or a sub-committee in each state.*

Committee on the Requirements for the Ebert and the Kilmer Prizes.—*Chairman*, M. R. Thompson, Baltimore; H. W. Youngken, Boston; C. O. Lee, La Fayette, Ind.; W. J. Husa, Gainesville; L. C. Zopf, Iowa City.

Committee to Study By-Laws.—*Chairman*, R. L. Swain, Baltimore, Md.; W. B. Day, Chicago, Ill.; J. H. Beal, Fort Walton, Fla.; R. P. Fischelis, Trenton, N. J.; E. F. Kelly, Washington, D. C.

American Documentation Institute.—*Delegate*, E. F. Kelly, Washington, D. C.

American Society for Testing Materials.—Committee on Glass and Glass Products—*Delegate*, Kenneth L. Kelly, Washington, D. C.

Commission on Standardization of Biological Stains.—*Delegate*, Louis Gershenfeld, Philadelphia, Pa.

A. PH. A. LOCAL BRANCHES

Secretaries will please report incorrections and elections. Also render reports of meetings. Thank you.

BALTIMORE.

No fixed meeting night.

President, A. N. Hewing.
Vice-President, John C. Bauer.
Secretary-Treasurer, Robert S. Fuqua.
Chairmen of Committees: Membership, Gilbert Josephs; Professional Relations, Marvin J. Andrews; Science and Practice of Pharmacy, Samuel L. Fox; Education and Legislation, A. G. DuMez.

CHICAGO.

Meet third Tuesday.

President, H. M. Emig.
First Vice-President, Lawrence Templeton.
Second Vice-President, R. A. G. Linke.
Third Vice-President, O. U. Sisson.
Secretary-Treasurer, R. E. Terry.
Delegate to the House of Delegates, R. E. Terry.
Committee Chairmen: Membership, S. W. Morrison; Legislation, J. Riemenschneider; Practice, I. A. Becker; Medical Relations, Dr. Bernard Fantus; Publicity, J. Myers.

DETROIT.

Meet third Thursday.

President, Earl Soop.
First Vice-President, Ernest Collins.
Second Vice-President, Robert Church.
Secretary, Bernard A. Bialk.
Treasurer, Frederick F. Ingram.
Student Council: Robert Bedell, Marjorie Manning, W. U.; Leo Gartland, Joseph Stralka, D. I. T.; John Data, Howard Parker, U. of M.; Council of Clerks, John Karagulis, Robert Kleagon, W. U.; Leo Kezewzki, William Ford, D. I. T.; Edwin Kirth, Merle Dole, U. of M.

DISTRICT OF COLUMBIA.

President, W. Paul Briggs.
First Vice-President, F. A. Delgado.
Second Vice-President, S. L. Hilton.
Third Vice-President, W. F. Howes.
Secretary, V. B. Norelli.
Treasurer, W. T. McCloskey.
Member Council, A. C. Taylor.
Chairmen: Membership, Fred Campbell; Legislative, E. F. Kelly; Fraternal or Medicinal Relations, D. L. Maxwell; Publicity, Paul Reznek.

NEW YORK.

Meet second Monday.

President, Frederick C. A. Schaefer.
Vice-President, Otto F. A. Canis.
Secretary, Horace T. F. Givens.
Treasurer, Turner F. Currens.
Delegate to the House of Delegates, Hugo H. Schaefer.
Secretary, Remington Honor Medal Committee, Hugo H. Schaefer.
Chairmen of the Committees: Education and Legislation, Robert S. Lehman; Progress of Pharmacy, Leonard W. Steiger; Professional Relations, James H. Kidder; Audit, Ernst A. Bilhuber; Membership, Rudolf O. Hauck.

NORTHERN NEW JERSEY.

President, A. F. Marquier.
Vice-President, Robert W. Rodman.
Secretary, C. L. Cox.
Treasurer, Sebastian Mecca.

NORTHERN OHIO.

President, F. J. Cermak.
Vice-President, W. W. Hosler.
Secretary, Neil T. Chamberlin.
Treasurer, M. A. Baum.

NORTH PACIFIC.

President, L. G. Haack.
First Vice-President, Frederick Grill.
Second Vice-President, Ed. Stipe.
Secretary-Treasurer, F. A. Geue.
Chairmen of Committees: Practical Pharmacy, Harry Weis; Professional Relations, L. G. Haack; Programs, Earl Gunther; Membership, Frank Nau.

NORTHWESTERN.

President, E. B. Fischer.
Secretary-Treasurer, C. V. Netz.

PHILADELPHIA.

President, H. E. Kendig.
First Vice-President, S. H. Kerlin.
Second Vice-President, George E. Byers.
Secretary-Treasurer, A. K. Leberknight.
Chairmen of Committees: Professional Relations, W. A. Pearson; Practical Pharmacy, Ambrose Hunsberger; Membership, S. H. Kerlin; Entertainment, Prof. Adley B. Nichols.
Delegate to the House of Delegates, Ambrose Hunsberger.

PITTSBURGH.

Meet third Tuesday.

President, Gordon Sleigh.
Vice-President, Melvin Green.
Secretary-Treasurer, Frank S. McGinnis.
Delegate to the House of Delegates, C. Leonard O'Connell.

UNIVERSITY OF CALIFORNIA STUDENT BRANCH.

President, Harry K. Iwamoto.
Vice-President, Ray Arlin.
Secretary, Peggy Kreizinger.
Treasurer, Annette Fouch.
Council Representative, Vivian Figone.
Student Director, Drug Garden, Lawrence Schuck
Graduate Director, Drug Garden, Gleb Popoff.

UNIVERSITY OF SOUTHERN CALIFORNIA, STUDENT BRANCH.

President, Elvin Schmidt.
Vice-President, Dave Ostrom.
Secretary, Walter Suda.
Treasurer, Darrell Janzen.
Faculty Advisors, Harold R. Bowers and Alvah G. Hall.

UNIVERSITY OF FLORIDA, STUDENT BRANCH.

President, J. F. Cooley, Jr.
Vice-President, H. B. Van Slyke.
Secretary, R. H. Weaver, Jr.
Treasurer, T. C. Keller.

STUDENT BRANCH, PITTSBURGH COLLEGE OF PHARMACY.

President, John Nosialak.
Vice-President, Robert Kealey.
Secretary-Treasurer, Sidney Goudelman.

STUDENT BRANCH, STATE COLLEGE OF WASHINGTON.

President, Harold Freed.
First Vice-President, Ray Seaman.
Second Vice-President, Creta Kidder.
Secretary-Treasurer, Belle Wenz Dirstine.
Reporter, Harold Freed.

ST. JOHN'S UNIVERSITY STUDENT BRANCH.

President, Saul Asnis.
Vice-President, Isidore J. Berman
Treasurer, John E. Graziano.
Secretary, Isabelle Seissman.

LOUISVILLE COLLEGE OF PHARMACY STUDENT BRANCH.

President, William J. Walsh.
Vice-President, Fred P. Kranz, Jr.
Secretary, Joe Black.
Treasurer, John M. Burton.
Faculty Adviser, Dean G. L. Curry.
Program Committee: *Chairman*, Horace Hannon, Sister Crescentia Wise, Henry J. Zurlage.
Student Activities Committee: *Chairman*, Claude M. Lloyd, Sister Margaret Ann Schwering, Edward E. Krebs.
Membership Committee: *Chairman*, Fred P. Kranz, Jr., Hal F. Acuff, Joe P. Forgy, Jr.

UNIVERSITY OF MISSISSIPPI STUDENT BRANCH.

President, James M. Day.
Vice-President, E. E. Eaton.
Secretary, Bless Rusk.
Treasurer, F. M. Posey.
Reporter, Murle Brock.

OFFICERS OF PHARMACEUTICAL ASSOCIATIONS—1937–1938.

Secretaries are respectfully asked to assist in correcting this list and make the roster a mutual service.

Alabama.—*President*, E. M. Megginson, Mobile; *Vice-President*, E. W. Gibbs, Birmingham; *Treasurer*, W. H. Ward, Tuscaloosa; *Secretary*, Z. C. Lewis, Box 1008, Montgomery. *Place of Meeting*, Birmingham. *Time*, 1938.

Arizona.—*President*, N. W. Stewart, Phoenix; *First Vice-President*, L. R. Johnson, Tucson; *Second Vice-President*, W. C. Denson, Mesa; *Treasurer*, I. V. Kisseberth, Phoenix; *Secretary*, N. S. McCollum, 401 Title & Trust Bldg., Phoenix.

Arkansas.—*President*, Roger M. Martin, Norphlet; *First Vice-President*, G. M. Eisele, Hot Springs; *Second Vice-President*, W. B. Simmons, Texarkana; *Treasurer*, Troy D. Churchman, N. Little Rock; *Secretary and Manager*, Irl Brite, Room 225, Capital Hotel, Little Rock.

California.—*President*, L. J. Fischl, Berkeley; *First Vice-President*, T. D. Perkins, San Diego; *Second Vice-President*, Charles Leudeking, Oakland; *Third Vice-President*, John G. Wagner, Long Beach; *Secretary*, Roy S. Warnack, 430 H. W. Hellman Bldg., Los Angeles; *Treasurer*, Charles R. Seward, Pasadena. *Place of Meeting*, Oakland. *Time*, 1938.

Colorado.—*President*, H. Rodney Anderson, Montrose; *First Vice-President*, Ralph E. Kemp, Lafayette; *Second Vice-President*, Alfred C. Anderson, Julesburg; *Treasurer*, C. C. Gilbert, Greeley; *Secretary*, Charles J. Clayton, 1042 E. Colfax Ave., Denver.

Connecticut.—*President*, William J. Dunphy, Waterbury; *First Vice-President*, Frank C. Gross, Glenbrook; *Second Vice-President*, Thomas E. Nugent, New Haven; *Third Vice-President*, Bridgeport; *Secretary*, Alice-Esther Garvin, 20 Lake Place, New Haven; *Treasurer*, George F. Blackall, Bristol.

Delaware.—*President*, Thomas Donaldson, Wilmington; *First Vice-President*, Frank E. Brereton, Milford; *Second Vice-President*, Peter P. Potocki, Wilmington; *Third Vice-President*, William E. Hastings, Selbyville; *Secretary*, Albert Bunin, 1713 W. Fourth St., Wilmington; *Treasurer*, Albert Dougherty, Wilmington.

District of Columbia.—*President*, A. L. Suter; *Vice-Presidents:* J. G. Biggs, F. B. Campbell, M. Goldstein, Ralph Judd, T. A. Moskey, H. J. Werner; *Secretary-Treasurer*, W. Paul Briggs, School of Pharmacy, George Washington Univ.

Florida.—*President*, R. Q. Richards, Fort Myers; *First Vice-President*, George Moore, Clearwater; *Second Vice-President*, C. G. Hamilton, Pompano; *Third Vice-President*, L. H. Penberthy, Tampa; *Secretary-Manager*, A. W. Morrison, 400 N. W. Second Ave., Miami; *Attorney*, Robert H. Givens, Miami. *Place of Meeting*, Hollywood Beach. *Time*, May 10–12, 1938.

Georgia.—*President*, J. W. Brinson, Wrightsville; *First Vice-President*, W. W. Fincher, Canton; *Second Vice-President*, Bonne Brown, Lyons; *Third Vice-President*, John White, Thomasville; *Secretary*, Z. O. Moore, 501 Volunteer Bldg., Atlanta; *Treasurer*, T. C. Marshall, Atlanta; *Chairman, Board of Directors*, Charles H. Evans, Warrenton.

Idaho.—*President*, J. Earl Evans, Idaho Falls; *First Vice-President*, C. C. Kingsbury, Twin Falls; *Second Vice-President*, E. W. Sinclair, Jerome; *Secretary-Treasurer*, Elmer B. Williams, 1101 Main St., Boise. *Place of Meeting*, Lewiston. *Time*, June 27–28, 1938.

Illinois.—*Honorary President*, Wm. B. Day, Chicago; *President*, Michael J. Kerwin, Joliet; *First Vice-President*, Joseph Allegretti, Chicago; *Second Vice-President*, J. S. Stotlar, Pinckneyville; *Third Vice-President*, J. Harry Lindahl, Chicago; *Treasurer*, Arno W. Reinhardt, Rockford; *Secretary*, Joseph J. Shine, 77 W. Washington St., Chicago.

Indiana.—*President*, Kiefer Elliott, Sheridan; *First Vice-President*, Charles E. Reed, Winchester; *Second Vice-President*, Steven Badanish, Gary; *Third Vice-President*, R. L. Loser, Noblesville; *Secretary*, F. V. McCullough, 305-306 Elsby Bldg., New Albany; *Treasurer*, Harry J. Borst, Indianapolis. *Place of Meeting*, French Lick. *Time*, June 21–23, 1938.

Iowa.—*President*, A. E. Thomas, Des Moines; *First Vice-President*, George W. McChane, Waterloo; *Second Vice-President*, E. O. Thorson, Akron; *Third Vice-President*, George L. Brown, Onawa; *Treasurer*, J. M. Lindly, Winfield; *Secretary*, J. W. Slocum, 404 W. Ashland Ave., Indianola.

Kansas.—*President*, Klon Randle, Wichita; *First Vice-President*, C. J. Arbuthnot, Lebanon; *Second Vice-President*, W. S. Daugherty, Syracuse; *Secretary*, Mrs. Clara B. Miller, 824 Kansas Ave., Topeka; *Treasurer*, Blaine Miller, Salina; *Librarian*, L. D. Havenhill, Lawrence. *Place of Meeting*, Topeka. *Time*, April 1938.

Kentucky.—*President*, Albert E. Ely, Glasgow; *First Vice-President*, Emil Nehring, Covington; *Second Vice-President*, Phil Arnold, Franklin; *Third Vice-President*, J. E. Croley, Pineville; *Treasurer*, William L. Johnston, Mayfield; *Secretary*, J. W. Gayle, 228 W. Main St., Frankfort. *Place of Meeting*, Middlesboro. *Time*, June 21, 1938.

Louisiana.—*President*, A. P. Lauve, New Orleans; *Vice-Presidents:* George S. Morse, New Orleans; Kirtley Lynch, Washington; Henry Richardson, Shreveport; Raymond Ware, Monroe; John E. Guess, Hammond; E. L. McClung, Natchitoches; *Corresponding Secretary*, Paul Weilbaecher, 2634 St. Philip St., New Orleans; *Recording Secretary*, Joseph H. Berner, 4700 Freret St., New Orleans.

Maine.—*President*, P. S. Demers, Springvale; *First Vice-President*, Carl Anderson, Bath; *Second Vice-President*, Frank Hargreaves, Mexico; *Third Vice-President*, E. A. Hay, Portland; *Treasurer*, George O. Tuttle, Portland; *Secretary*, James H. Allen, 118 Main St., Waterville.

Maryland.—*President*, R. L. Swain, Baltimore; *First Vice-President*, A. A. M. Dewing, Centerville; *Second Vice-President*, A. N. Hewing, Baltimore; *Third Vice-President*, L. N. Richardson, Bel Air; *Secretary*, E. F. Kelly, 2411 N. Charles St., Baltimore; *Treasurer*, A. F. Wannewetch, Baltimore.

Massachusetts.—*President*, James L. Case, E. Boston; *First Vice-President*, John J. Morrissey, Lawrence; *Second Vice-President*, Chester W. Ashley, Attleboro; *Treasurer*, Lyman W. Griffin, Allston; *Secretary*, James F. Finneran, 10 Otis St., Everett.

Michigan.—*President*, A. A. Sprague, Ithaca; *First Vice-President*, C. B. Campbell, Jackson; *Second Vice-President*, M. N. Henry, Lowell; *Treasurer*, Ralph Broadbent, Lansing; *Secretary*, Otis F. Cook, 1514 Olds Tower Bldg., Lansing. *Place of Meeting*, Lansing. *Time*, June 1938.

Minnesota.—*President*, J. B. Slocumb, St. Paul; *First Vice-President*, George Kermott, Duluth; *Second Vice-President*, L. E. Merwin, Minneapolis; *Third Vice-President*, Fred Kustermann, Minneapolis; *Treasurer*, Charles T. Heller, Jr., St. Paul; *Secretary*, A. Roy F. Johnson, 5001 Wentworth Ave., Minneapolis. *Place of Meeting*, Minneapolis. *Time*, April 25–29, 1938.

Mississippi.—*President*, C. H. Hayes, Philadelphia; *First Vice-President*, D. B. Sharron, Jackson; *Second Vice-President*, T. H. Spencer, Greenville; *Secretary Treasurer*, S. B. Key, Jackson.

Missouri.—*Honorary President*, T. B. Montgomery, Warrensburg; *President*, Maurice D. Brummell, Salisbury; *First Vice-President*, Keith Karnes, North Kansas City; *Second Vice-President*, Ted Willard, Camdenton; *Third Vice-President*, Emanuel Greengard, St. Louis; *Secretary*, Kenneth Nichols, Jefferson City; *Treasurer*, Murray Q. Williams, Warrensburg. *Time*, 1938.

Montana.—*President*, L. H. Morrow, Great Falls; *Vice-Presidents:* Steve Holt, Broadus; George M. Gossman, Dillon; *Treasurer*, H. J. Rakeman, Jr., Ennis; *Secretary*, J. A. Riedel, Boulder. *Place of Meeting*, Great Falls. *Time*, July 1938.

Nebraska.—*President*, Henry G. Lee, Omaha; *Vice-Presidents*, Homer Bowen, Grand Island; Emil Cermak, Omaha; J. Max Haeberle, Broken Bow; John W. Buswell, Fairbury; John C. Munt, Omaha; *Secretary*, J. G. McBride, 407 Federal Securities Bldg., Lincoln; *Treasurer*, Orel Jones, Oconto. *Place of Meeting*, Grand Island. *Time*, May 1938.

Nevada.—*President*, Clarence Hale, Reno; *First Vice-President*, W. E. Ferron, Las Vegas; *Second Vice-President*, Frank F. Schwartz, Ely; *Secretary-Treasurer*, Lester J. Hilp, Reno. *Place of Meeting*, Reno.

New Hampshire.—*President*, George A. Moulton, Peterborough; *First Vice-President*, Charles E. Green, Pittsfield; *Second Vice-President*, G. M. Clark, Nashua; *Secretary*, A. O. Burque, Kinsley St., Nashua, *Treasurer*, A. E. Gosselin, Manchester; *Auditor*, H. E. Rice, Nashua.

New Jersey.—*President*, A. R. Granito, Hackensack; *First Vice-President*, Emil P. Martini, Hackensack; *Second Vice-President*, N. Herman Rappaport, Camden; *Secretary*, Prescott R. Loveland, 28 W. State St., Trenton; *Treasurer*, Charles J. McCloskey, Branchville. *Place of Meeting*, Atlantic City. *Time*, June 1938.

New Mexico.—*President*, Frank J. McCarthy, Hagerman; *First Vice-President*, George B. Riddle, Hot Springs; *Second Vice-President*, Angus L. Evans, Espanola; *Secretary-Treasurer*, H. E. Henry, 1629 N. 4th St., Albuquerque. *Place of Meeting*, Albuquerque. *Time*, May 18–19, 1938.

New York.—*Honorary President*, J. Leon Lascoff, New York; *President*, Edgar S. Bellis, Bronxville; *First Vice-President*, Percy Goldman, Brooklyn; *Second Vice-President*, Thomas A. J. Rocchio, Bronx; *Third Vice-President*, Wentworth H. Barnes, Troy; *Treasurer*, Richard A. Austin, Cairo; *Secretary*, Robert S. Lehman, 295 Washington Ave., Brooklyn; *Attorney*, Joseph J. Hammer.

North Carolina.—*President*, P. J. Suttlemyre, Hickory; *Vice-Presidents:* C. C. Fordham, Jr., Greensboro; J. C. Brantley, Jr., Raleigh; Joseph Hollingsworth, Mt. Airy; *Secretary-Treasurer*, J. G. Beard, University of North Carolina, Chapel Hill; *Attorney*, F. O. Bowman, Chapel Hill. *Place of Meeting*, Asheville. *Time*, 1938.

North Dakota.—*President*, Philip H. Boise, Dickinson; *Vice-President*, Harry Gray, Wilton; *Secretary*, C. B. Hay, 716 Front St., Fargo; *Treasurer*, P. H. Costello, Cooperstown. *Place of Meeting*, Mandan. *Time*, 1938.

Ohio.—*President*, P. A. Schwarz, Cincinnati; *First Vice-President*, Harry Baskind, Cleveland; *Second Vice-President*, James E. Neal, Toledo; *Treasurer*, L. W. Funk, Columbus; *Secretary*, V. L. Keys, 30 E. Broad St., Columbus. *Place of Meeting*, Dayton. *Time*, July 1938.

Oklahoma.—*President*, Jess W. Stunkle, Enid; *First Vice-President*, B. M. Jones, Tulsa; *Second Vice-President*, Dave F. McLemore, Britton; *Treasurer*, G. C. Cooper, Edmond; *Secretary*, Elbert R. Weaver, Stillwater.

Oregon.—*President*, A. S. Keir, Hood River; *Vice-President*, E. A. Bachman, Portland; *Secretary*, L. S. Stovall, 721 Morgan Building, Portland; *Treasurer*, Frank Nau, Portland; *Assistant Secretary and Manager*, Jack J. Lynch, 420–421 Morgan Bldg., Portland.

Pennsylvania.—*President*, George F. Young, McKeesport; *First Vice-President*, Nathan Zonies, Philadelphia; *Second Vice-President*, W. Thomas Senseman, Jr., Harrisburg; *Third Vice-President*, R. S. Rileigh, Kingston; *Secretary-Treasurer*, J. B. Pilchard, 227 State St., Harrisburg.

Philippine Islands.—*President*, Apolonio R. Chaves; *First Vice-President*, Alfredo C. Santos, Manila; *Second Vice-President*, Jose E. Jimenez; *Secretary*, Antonio Belmonte, c/o Manila College of Pharmacy, Manila; *Assistant Secretary*, Victorio C. Dionisio; *Treasurer*, Pedro C. Batallones; *Assistant Treasurer*, Remedios Reynado.

Porto Rico—Board of Directors: *President*, Alberto Pelegrina, San Juan; *Vice-President*, Candido A. Martinez, Caguas; *Secretary-Treasurer*, Ramon Lopez Irizarry, P. O. Box 3815, San Juan; *Counsellors:* Angel M. Diaz, Hector Urrutia, Carlos G. Gonzalez, Francisco L. Anselmi, Antonio Maisonave, Armando Arroyo, Juan T. Puig, Zoilo Zotomayor, Francisco Sosa Perez, Raul Acosta, Victoriano Pagan Colon Enrique Anglade, Luis R. Emanuelli, V. M. Colon.

Rhode Island.—*President*, Joseph L. McDonald, Providence; *First Vice-President*, William D. Strachan; *Second Vice-President*, Leo Brennan; *Secretary*, Andrew A. Kamalian; *Treasurer*, Richard W. Blanding, Providence.

South Carolina.—*President*, P. S. McCollum, Clemson College; *First Vice-President*, G. G. Caughman, Columbia: *Second Vice-President*, John F. Seignious, Charleston; *Third Vice-President*, W. H. Atkinson, Columbia; *Secretary-Treasurer*, J. M. Plaxco, Due West. *Place of Meeting*, Columbia. *Time*, June 1938.

South Dakota.—*President*, Thomas K. Haggar, Sioux Falls; *Vice-Presidents:* C. A. Locke, Brookings; H. S. Crissman, Ipswich; J. A. Clute, Murdo; *Treasurer*, Frank S. Bockoven, Clark; *Secretary*, Kenneth Jones, Gettysburg. *Place of Meeting*, Mobridge.

Tennessee.—*President*, William P. Winter, Nashville; *First Vice-President*, H. B. Mosley, Knoxville; *Second Vice-President*, Leland Cranford, Memphis; *Third Vice-President*, F. R. Rogers, Dayton; *Treasurer*, H. J. Berryhill, Jackson; *Secretary*, Tom C. Sharp, 324 Vendome Bldg., Nashville. *Place of Meeting*, Knoxville. *Time*, 1938.

Texas.—*President*, Festus Pierce, Corsicana; *First Vice-President*, W. U. Paul, El Paso; *Second Vice-President*, Murray Thames, Beaumont; *Secretary-Treasurer*, Dr. W. J. Danforth, 5th & Calhoun Sts., Fort Worth; *Vice-Chairman, Executive Committee*, L. D. Gilmore, San Antonio; *Editor*, Walter D. Adams, Forney.

Utah.—*President*, T. Ray Kingston, Murray; *First Vice-President*, Harold Voiles, Salt Lake City; *Second Vice-President*, Ray Grant, Brigham; *Secretary*, George F. Flashman, 1702 S. 11th St., Salt Lake City; *Treasurer*, Walter H. Dayton, Salt Lake City. *Place of Meeting*, Ogden. *Time*, 1938.

Vermont.—*President*, Joseph W. Blakeley, Montpelier; *Vice-President*, Mrs. Mabel Clifford, Bethel; *Secretary-Treasurer*, F. W. Wheeler, Springfield.

Virginia.—*President*, Roy L. Crouch, Roanoke; *Vice-Presidents:* Virgil R. May, Richmond; J. C. Kearfott, Martinsville; C. G. Patterson, Lynchburg; *Secretary-Treasurer*, A. L. I. Winne, 105 State Office Bldg., Richmond. *Place of Meeting*, Hot Springs. *Time*, July 7–9, 1938.

Washington.—*President*, Roy O. Willett, Yakima; *First Vice-President*, Graham A. Condie, Seattle; *Second Vice-President*, Jesse W. Staggs, Walla Walla; *Treasurer*, Walter H. Hinman; *Secretary*, M. P. Goodner, 430 Henry Bldg., Seattle. *Place of Meeting*, Seattle. *Time*, July 1938.

West Virginia.—*President*, G. S. Flesher, Cairo; *First Vice-President*, W. S. Coleman, Lewisburg; *Second Vice-President*, H. R. Ridenour, Beckley; *Third Vice-President*, J. Edgar Johnson, Charleston; *Secretary-Treasurer*, J. Lester Hayman, 325 Ash St., Morgantown. *Place of Meeting*, Charleston. *Time*, 1938.

Wisconsin.—*President*, Wm. M. Rhyme, Portage; *First Vice-President*, Karl Henrich, Superior; *Second Vice-President*, Fred Look, Madison; *Third Vice-President*, H. W. Spearbraker, New London; *Treasurer*, B. F. Leidel, Milwaukee; *Secretary*, Jennings Murphy, 621 N. Sixth St., Milwaukee. *Time*, June 1938.

Wyoming.—*President*, T. J. Gatchell, Buffalo; *First Vice-President*, Frank L. Korfanta, Rock Springs; *Second Vice-President*, D. M. Kellam, Torrington; *Secretary-Treasurer*, John B. Tripeny, 214 S. Center St., Casper. *Place of Meeting*, Buffalo. *Time*, May 16–17, 1938.

NATIONAL ASSOCIATIONS.

American Association of Colleges of Pharmacy.—*President*, Hugh C. Muldoon, Pittsburgh, Pa.; *Vice-President*, E. L. Hammond, University, Miss.; *Secretary*, Zada M. Cooper, Iowa City, Iowa; *Chairman* of *the Executive Committee*, Ernest Little, Newark, N. J.

American Drug Manufacturers Association.—*President*, John F. Anderson, New Brunswick, N. J.; *Vice-Presidents:* Oscar W. Smith, Detroit, Mich.; S. DeWitt Clough, N. Chicago, Ill.; F. S. Stearns, Detroit, Mich.; *Treasurer*, Robert Lincoln McNeil, Philadelphia, Pa.; *General Counsel*, Horace W. Bigelow, Detroit, Mich.; *Executive Vice-President and Secretary*, Carson P. Frailey, 506–7 Albee Bldg., Washington, D. C. *Members of the Executive Committee:* George W. Merck, Rahway, N. J.; J. G. Searle, Chicago, Ill.; L. N. Upjohn, Kalamazoo, Mich.; John S. Zinsser, Philadelphia, Pa.; A. C. Boylston, St. Louis, Mo.

American Pharmaceutical Manufacturers' Association.—*President*, Carroll D. Smith, Orange, N. J.; *First Vice-President*, H. B. Johnson, Pittsburgh, Pa.; *Second Vice-President*, L. D. Humphrey, New York City; *Secretary*, Fred A. Lawson, % E. L. Patch Co., Stoneham P. O., Boston, Mass.; *Treasurer*, Frank A. Mallett, Des Moines, Iowa.

Canadian Pharmaceutical Association.—*Honorary Presidents*, F. J. Hoag, Kingston, Ont.; P. W. Holdsworth, Digby, N. S.; H. L. Bethune, Charlottestown, P. E. L.; Walter Bews, New Westminster, B. C.; *President*, F. W. Heath, Edmonton, Alta, Can.; *Vice-President*, W. B. Mahony, Saint John, N. B.; *Secretary*, R. B. J. Stanbury, 43 Victoria St., Toronto, Can.

Federal Wholesale Druggists Association.—*President*, George A. Raab, Providence, R. I.; *Vice-President*, S. C. James, Buffalo, N. Y.; *Secretary*, R. E. Lee Williamson, 123 Market Place, Baltimore, Md.; *Treasurer*, O. J. Schmitz, Atchison, Kansas; *Sergeant-at-Arms*, Paul Pearson, Washington, D. C.

Mention the Journal of the A. Ph. A. when writing advertisers—It identifies you.

National Association of Boards of Pharmacy.—*Honorary President*, J. W. Gayle, Frankfort, Ky.; *President*, Robert L. Swain, Baltimore, Md.; *Vice-Presidents:* William J. Dunphy, Connecticut; Roy B. Cook, West Virginia; Lew Wallace, Mississippi; Sylvester Dretzka, Wisconsin; Walter Varnum, Kansas; R. C. Shultz, Wyoming; Linn Jones, Oregon; *Secretary*, H. C. Christensen, 130 N. Wells St., Chicago, Ill.

National Association of Retail Druggists.—*President*, Thomas S. Smith, Wilmington, Del.; *First Vice-President*, John B. Tripeny, Casper, Wyo.; *Second Vice-President*, Walter H. Varnum, Lawrence, Kans.; *Third Vice-President*, N. G. Miller, Purcellville, Va.; *Treasurer*, Z. O. Kerrigan, St. Louis, Mo.; *Secretary*, John W. Dargavel, 205 Wacker Drive, Chicago, Ill.

National Wholesale Druggists' Association.—*President*, J. Mahlon Buck, Philadelphia, Pa.; *Vice-President*, Thomas O. Duff, Chattanooga, Tenn.; Ben Richardson, San Antonio, Texas; Robert L. Trunk, Detroit, Mich.; A. J. Rocca, Chicago, Ill.; Ray Shumacher, Brooklyn, N. Y.; *Executive Vice-President and Secretary*, E. L. Newcomb, 330 W. 42nd St., New York City; *Treasurer*, Title Guarantee and Trust Co., New York City. *Place of Meeting*, White Sulphur Springs, W. Va. *Time*, September 25–28, 1938.

CONFERENCES.

Conference of Pharmaceutical Association Secretaries.—*President*, P. R. Loveland, Trenton, N. J.; *First Vice-President*, J. B. Pilchard, Harrisburg, Pa.; *Second Vice-President*, R. S. Lehman, Brooklyn, N. Y.; *Secretary-Treasurer*, J. L. Hayman, Morgantown, W. Va.; *Delegate to House of Delegates*, F. V. McCullough, New Albany, Ind.

Conference of Pharmaceutical Law Enforcement Officials.—*Chairman*, R. L. Swain, Baltimore, Md.; *Secretary-Treasurer*, M. N. Ford, Columbus, O.; *Delegate to the House of Delegates*, J. B. Pilchard, Harrisburg, Pa.

National Conference of Pharmaceutical Research.—*Chairman*, George D. Beal, Pittsburgh, Pa.; *Vice-Chairman*, William J. Husa, Gainesville, Fla.; *Secretary*, John C. Krantz, Baltimore, Md.

National Drug Trade Conference.—*President*, Carson P. Frailey, Washington, D. C.; *Vice-President*, A. C. Taylor, Washington, D. C.; *Secretary-Treasurer*, Rowland Jones, Jr., 1163 National Press Bldg., Washington, D. C.

STATE BOARDS OF PHARMACY.

Alabama.—*President*, John A. Edwards, Anniston; *Vice-President*, Paul Molyneux, Mobile; *Secretary-Treasurer*, Sam A. Williams, Box 224, Troy; N. G. Hubbard, Birmingham; L. C. Lewis, Tuskegee.

Alaska.—*President*, H. R. Vander Leest, Juneau; *Vice-President*, R. T. Kubon, Fairbanks; *Secretary-Treasurer*, Elwyn Swetmann, Seward. *First Division*, H. R. Vander Leest, Juneau; Norman R. Walker, Ketchikan; *Second Division*, Ralph Kitzmiller, Nome. *Third Division*, Z. J. Loussac, Anchorage; Elwyn Swetmann, Seward. *Fourth Division*, F. M. Dunjam, Fairbanks; R. T. Kubon, Fairbanks.

Arizona.—*President*, Russell Meadows, Douglas; *Secretary-Treasurer*, N. S. McCallum, 401 Title & Trust Bldg., Phoenix; *Examiners*, Carter C. Norris, Cottonwood; Newell S. Stewart, Phoenix; L. R. Johnson, Tucson.

Arkansas.—*President*, C. R. Counts, Ozark; *Secretary*, H. W. Parker, Jonesboro; F. G. Ward, Hope; L. K. Snodgrass, Little Rock; Vince Harrington, Marianna.

California.—*President*, Andre Rouseyrol, Los Angeles; *Vice-President*, V. L. Schaefer, Alameda; *Treasurer*, J. S. Ramsay, San Francisco; Charles Swiggett, Los Angeles; Albert C. Kasper, San Francisco; Edna E. Gleason, Stockton; Francis A. Walsh, Los Angeles; *Secretary*, Wm. M. Fulton, San Francisco.

Colorado.—*President*, Wm. J. Bishop, Greeley; *Secretary*, Joseph P. Murray, Colorado Springs; Ralph E. Kemp, Lafayette.

Connecticut.—*President*, Charles Gustafson, Hartford; *Secretary-Treasurer*, Hugh P. Beirne, 615 Howard Ave., New Haven; George Blackall, Bristol; Edward J. Murphy, Manchester; Wm. J. Dunphy, Waterbury.

Delaware.—*President*, T. H. Cappeau, Wilmington; *Vice-President*, R. M. Kaufman, Seaford; *Secretary-Treasurer*, John O. Bosley, Wilmington; George W. Rhodes, Newark; James M. Wise, Dover.

District of Columbia.—*President*, A. C. Taylor, Washington, D. C.; *Secretary*, Louis F. Bradley, 701 Maryland Ave., N. E., Washington, D. C.; R. L. Quigley, 2036 G St., N. W., Washington, D. C.; Morris Goldstein, Washington, D. C.; Vincent B. Norelli, Washington, D. C.

Florida.—*President*, J. K. Clemmer, Miami; *First Vice-President*, J. K. Attwood, Jacksonville; *Second Vice-President*, W. A. Hunter, Live Oak; *Secretary-Treasurer*, C. G. Hamilton, Pompano; W. M. Hankins, Daytona.

Georgia.—*President*, W. G. Bridges, Columbus; *Joint Secretary, Georgia Examining Boards*, R. C. Coleman, Atlanta; R. M. Mitchell, Griffin; W. L. West, Sandersville; L. N. Camp, Atlanta; Harold M. Herrin, Winder.

Idaho.—*Commissioner of Law Enforcement*, J. L. Balderston, Boise; *Examining Committee: President*, J. P. Halliwell, Pocatello; *Vice-President*, Charles Carter, Moscow; *Secretary*, J. Earl Evans, Idaho Falls.

Illinois.—*Superintendent of Registration, Dept. of Registration and Education*, Homer J. Byrd, Springfield; *Examining Committee: President*, Joseph E. Allegretti, 1201 W. Grand Ave., Chicago; Al Chulock, Chicago; Wm. H. Stokes, Taylorville; *Secretary*, Mrs. Alice Pelikan, Oak Park; Robert F. Johnson, Decatur.

Indiana.—*President*, Fred Thomas, Greenfield; *Secretary*, Russell B. Rothrock, Evansville; J. A. J. Funk, Galveston; Edgar A. O'Harrow, Indianapolis; Albert C. Fritz, Indianapolis.

Iowa.—*President*, Duane H. Redfield, Shenandoah; *Secretary*, John Heerema, State House, Des Moines; George W. Gillman, Ft. Dodge; V. H. Tyler, Lenox.

Kansas.—*President*, Otto H. Kuether, Herington; *Secretary*, Walt Varnum, Lawrence; *Advisory Secretary*, Mac Childs, Box 231, Eldorado; *Treasurer*, Kelsey Petro, Topeka; Gene Cook, Iola; W. F. Sprague, Fredonia.

Kentucky.—*President*, M. Alvin Vaugh, Bowling Green; *Secretary*, J. W. Gayle, 228 W. Main St., Frankfort; *Treasurer*, James F. Wilson, Mayfield; A. P. Markendorf, Louisville; John W. Hutchinson, Lexington; Charles H. Tye, Harlan.

Louisiana.—*President*, Wm. August Worner, New Orleans; *Secretary*, John E. Guess, Hammond; W. E. Harter, New Orleans; T. A. Chisholm, Eunice; E. H. White, Oil City; Edward H. Walsdorf, New Orleans; Eugene W. Vogt, Ferriday; Edwin L. McClung, Natchitoches.

Maine.—*President*, Adolphe L. Rivard, Lewiston; Leon H. Marr, Farmington; Burton K. Murdock, Kennebunk.

Maryland.—*President*, H. R. Rudy, Hagerstown; *Secretary-Treasurer*, Robert L. Swain, 2411 N. Charles St., Baltimore; L. M. Kantner, Park & North Aves., Baltimore; Lloyd N. Richardson, Bel Air; L. V. Johnson, St. Michaels.

Massachusetts.—*President*, John F. Walsh, Lowell; *Secretary*, Charles W. King, 146 State House, Boston; Timothy F. Shea, Worcester, John R. Sawyer, Jamaica Plain; Augustus J. Lawler, Lawrence.

Michigan.—*President*, Frank Gillispie, St. Joseph; *Secretary*, Jerry C. Totzka, 503 Mutual Bldg., Lansing; H. A. K. Whitney, Ann Arbor; R. L. McCabe, Detroit; George Byrnes, Lansing; Norman A. Weess, Evart.

Minnesota.—*President*, J. G. Pasternacki, Virginia; *Secretary*, E. J. Prochaska, 2965 Minnehaha Ave., Minneapolis; Victor L. Feit, St. Paul; F. W. Moudry, St. Paul; Wm. C. Muesing, New Ulm; John Nelson, Lake Park.

Mississippi.—*President*, W. H. Rose, West Point; *Secretary*, Lew Wallace, Laurel; J. J. Gerache, Vicksburg; T. H. McMillion, McComb; Kelly M. Patterson, Jackson.

Missouri.—*President*, W. H. Ellis, Vandalia; Charles R. Bohrer, West Plains; William H. Harper, Maplewood; Perry Clark, Chillicothe; Elmer E. Hoppins, Kansas City.

Montana.—*President*, F. V. Patterson, Billings; *Secretary*, J. A. Riedel, Boulder; A. F. Peterson, Jr., Missoula; Walter A. Woehner, Great Falls.

Nebraska.—*Director, Examining Committee,* Mrs. Clark Perkins, State House, Lincoln; R. L. Whaley, Wahoo; Don A. Brooke, Hastings; M. E. Rasdal, Ogallala.

Nevada.—*President,* E. B. Loring, Fallon; *Secretary,* H. M. Skeels, Reno; Frank E. Swartz, Ely; W. E. Ferron, Las Vegas; R. W. Fleming, Tonopah.

New Hampshire.—*President,* John R. Kelly, Newport; *Secretary,* Percy J. Callaghan, Manchester; George A. Moulton, Peterborough.

New Jersey.—*President,* James A. Bauman, Ridgewood; *Treasurer,* Albert J. Smith, Bradley Beach; *Secretary,* R. P. Fischelis, Box 158, Trenton; Charles Schamach, Paterson; John J. Debus, Jersey City; Percy H. Jackson, Wildwood.

New Mexico.—*President,* F. M. Delgado, Las Vegas; *Vice-President,* W. A. Cloman, Carlsbad; *Secretary-Treasurer,* H. E. Henry, Albuquerque; C. C. Haussamen, Albuquerque; S. J. Mollands, Taos; George H. Sasser, Clovis.

New York.—*President,* Otto F. A. Canis, Cedarhurst; *Secretary,* George W. Mather, Education Building, Albany; Wm. C. Anderson, Brooklyn; Henry J. Wildhack, Newark; J. Leon Lascoff, New York City; Frank S. Houck, Gloversville; F. C. A. Schaefer, Brooklyn; Albert A. Muench, Syracuse; Willard H. Roberts, Utica; Elmer E. Chilson, Rochester.

North Carolina.—*President,* E. V. Zoeller, Tarboro; *Secretary-Treasurer,* F. W. Hancock, Oxford; M. B. Melvin, Raleigh; James G. Ballew, Lenoir; R. A. McDuffie, Greensboro; *Attorney,* F. O. Bowman, Chapel Hill.

North Dakota.—*President,* J. P. Cutting, Williston; *Secretary,* P. H. Costello, Cooperstown; E. P. Martin, Hazen; W. H. Schram, Hillsboro; N. M. Brakke, McVille.

Ohio.—*President,* F. H. King, Delphos; *Secretary,* Thomas J. Ryan, Room G 18, New State Office Building, Columbus; W. V. Verbryke, Toledo; J. W. Dysle, Marietta; W. G. Conrad, Cleveland; H. A. Stype, Wooster.

Oklahoma.—*President,* W. D. Patterson, El Reno; *Vice-President,* T. J. Dean, Okmulgee; *Secretary,* Edward Milligan, 412 Midwest Bldg., Oklahoma City; *Treasurer,* Thomas B. Casey, Tishomingo; J. A. Puryear, Pawhuska.

Oregon.—*President,* C. L. McFadden, Portland; *Vice-President,* M. E. McKee, Moro; *Secretary-Treasurer,* Linn E. Jones, 414 Oregon Bldg., Portland; John F. Allen, Corvallis; E. W. Haas, Sheridan; C. Earl Watkins, Portland.

Pennsylvania.—*President,* Fred J. Blumenschein, Uniontown; *Secretary,* Harry H. Buch, Harrisburg; George L. Kiefer, Aliquippa; Mary F. Sabatino, Philadelphia; John O'N. Casey, South Ardmore.

Philippine.—*Chairman,* José E. Jimenez; *Members,* Florencio Gavino; Apolonio R. Chaves; Dr. Jose V. Gloria, *Permanent Secretary of the Boards of Medical, Pharmaceutical, Dental, Nurses and Optical Examiners.*

Porto Rico.—*President,* Ramon Lopez Irizarry, San Juan; *Secretary,* Washington Llorens, Arecibo; *Treasurer,* Lumen M. Mendez, Lares; Sergio Seijo, Arecibo; Ramon F. Sosa, Ponce.

Rhode Island.—*Chief, Division of Narcotic Drugs and Pharmacies,* A. Norman LaSalle, Room 368, State Office Bldg., Providence; *Examiners:* Emery J. Lesvesque; James J. Gill and James J. Deery, Providence.

South Carolina.—*Chairman,* C. E. Powe, Hartsville; *Secretary,* J. J. Atkinson, 2911 Devine St., Columbia; Carl F. Gibson, Columbia; E. T. Gainey, Charleston; Charles G. Luther, Beaufort; M. L. Rogers, Easley, W. M. Davis, Marion.

South Dakota.—*President,* H. A. Sasse, Redfield; *Secretary,* Kenneth Jones, Gettysburg; George W. Lloyd, Spencer; E. C. Severin, Philip.

Tennessee.—*President,* George W. Fillauer, Chattanooga; *Secretary,* J. B. Sand, Nashville; Robert Walker, Nashville; T. D. Turner, Henning; Eugene Wright, Memphis; William Ellis, Knoxville.

Texas.—*President,* J. Dan Allen, Houston; *Secretary,* W. H. Cousins, Dallas; *Treasurer,* Emmett E. Weaver, Fort Worth; Erwin M. Joseph, Austin; Paul Carroll, Texarkana; Roy Phillips, San Antonio, M. E. Dooley, Wolfe City.

Utah.—*Director, Department of Registration,* S. W. Golding, Salt Lake City; *Examining Committee,* W. H. Dayton, Salt Lake City; Archibald Bevan, Tooele; Frank J. Folland, Salt Lake City.

Vermont.—*President,* Wm. B. Shangraw, Rutland; *Secretary,* Fred D. Pierce, Barton; *Treasurer,* O. W. McShane, Poultney; Harris W. Alexander, St. Albans; D. G. Aldrich, Bellows Falls.

Virginia.—*President,* W. E. Locke, Richmond; E. P. Berlin, Berryville; John C. Hopkins, East Radford; C. L. Guthrie, Petersburg; J. M. Lea, Danville; *Secretary-Treasurer,* A. L. I. Winne, 105 State Office Building, Richmond.

Washington.—*Chairman,* Peter H. Brady, Spokane; *Secretary,* Carlton I. Sears, Olympia; Thorman Jacobsen, Seattle.

West Virginia.—*President,* S. M. Scott, Jr., Terra Alta; *Secretary,* Roy B. Cook, Box 710, Charleston; Fred C. Allen, Marlinton; J. Louis Hawkins, Huntington; C. W. Collins, Parkersburg.

Wisconsin.—*President,* Edith C. Schmitz, Platteville; *Secretary,* H. G. Ruenzel, 2336 W. Vliet St., Milwaukee; Edwin J. Boberg, Eau Claire; Edward Kremers, Madison; S. H. Dretzka, S. Milwaukee; Edward S. Schweger, Green Bay.

Wyoming.—*President,* A. E. Roedel, Cheyenne; *Secretary,* R. C. Shultz, Worland; R. D. Dame, Casper.

PUBLICATIONS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

Proceedings and Year Books, 1851–1911, inclusive. Complete sets of the Proceedings and YEAR BOOKS of the AMERICAN PHARMACEUTICAL ASSOCIATION are becoming rare and no other set of volumes relating to the pharmaceutical profession and related sciences, of equal comprehensiveness, is available in the English language.

For more than twenty-three volumes of Proceedings or YEAR BOOKS a discount of fifty per cent is allowed; sixteen to twenty-two volumes, forty per cent; nine to fifteen volumes, thirty per cent; four to eight volumes, twenty per cent; two or three volumes, ten per cent.

PRICES OF VOLUMES, AS LONG AS AVAILABLE, ARE AS FOLLOWS.

1851, 1852, 1853, paper cover	$0.50
1855–1859, inclusive, paper cover	$1.00
1860, 1862, to 1873, inclusive, cloth bound	$1.50
1874–1890, " " "	$2.00
1891–1911, " " "	$4.00
YEAR BOOKS—1912–1934, inclusive, cloth bound	$4.00
Collective Index, 1852–1902, inclusive cloth bound	$5.00
" " 1903–1926, " " "	$6.50

Continued on Page xviii

Journal, Volumes 1912–1937, inclusive; single copies, $0.35; Bound Annual Volumes..... $6.00
National Formulary, Third Edition, cloth bound..... $1.50
" " Fourth " " " $3.50
" " Fifth " " " $3.50
" " Sixth " " " $5.00
Notes for the Physician, from N. F. VI (pamphlet); 1000, $14.00; 500, $7.50; 100, $4.00
Notes for the Dentist, " " " " " ; 1000, $11.50; 500, $6.00; 100, $1.25
Notes for the Dentist on Official Medication, from N. F. VI (pamphlet); 1000, $12.00; 500, $6.50 100, $1.35
Pharmaceutical Recipe Book, I, cloth bound..... $5.00
" " " II, " " $5.00
Professional Pharmacy, First Edition..... $0.25
" " Second Edition..... $0.25
Prescription Ingredient Survey, issued in 1932, cloth..... $2.00
Pharmaceutical Abstracts, Volume I (1935), cloth..... $2.00
" " Volume II (1936), cloth..... $2.00
" " Volume III (1937), cloth..... $2.00
A New Nomenclature of Chemistry, Dr. Morveau, Lavoisier, Bertholett and Fourcroy. Translation by Lyman Spalding, 1796, paper cover. Photostatic Reproduction... $1.00
Proof Pages, U. S. Pharmacopœia (1820), facsimile reproduction bearing corrections by Elisha De Butts in script and a note from Dr. Lyman Spalding to Dr. De Butts, 40 pages, bound in heavy paper cover, $5^1/_2$ by 9 inches. Photostatic Reproduction.. $3.00
Code of Ethics, A. PH. A., in two colors, enlarged for framing, 12 x 18..... $0.25

Photographs.

Headquarters, A. PH. A., mat..... $1.00
Sculptural Panels (A. I. P.), mat, $1.00 each; two..... $1.50
Post Cards, Exterior and Interior, A. PH. A. Headquarters, set of 7..... $0.25

Reprints.

"Reciprocity Explained"..... $0.05
"Prerequisite Legislation"..... $0.05
"A Pharmaceutical Study of p_H," F. F. Johnson, paper cover..... $0.25
"Report on Extent of Use of N. F. Galenicals," E. N. Gathercoal..... $0.25

The A. Ph. A. Patrons of the Advertising Pages

The JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION aims to give its advertisers full value; this is possible by the coöperation of the membership of the AMERICAN PHARMACEUTICAL ASSOCIATION—attention is therefore directed to the pages carrying the messages of the Advertising Patrons.

Directory of Advertisers

A. PH. A. Roster.....xi, xii
Boards of Pharmacy Roster.....xvi, xvii
Conferences.....xvi
State and National Associations Roster.....xiv, xv, xvi
Officers of the Local Branches, A. PH. A.....xiii

Books

Remington's Practice of Pharmacy.....—
P. Blakiston's Son & Co.....viii
J. B. Lippincott Company.....—
National Formulary VI.....xviii
Pharmaceutical Recipe Book.xviii
Pharmaceutical Syllabus.....—
Professional Pharmacy.....xviii
Reprints.....xviii
U. S. Dispensatory.....—

Bottles

Kimble Glass Company.....—
Owens-Illinois Glass Company.—

Chemicals

Ciba Company.....—
Hoffmann-La Roche, Inc.....—
Mallinckrodt Chemical Works..—
Merck & Co.....—
N. Y. Quinine & Chemical Works.....vi
Sanox Company.....ix
E. R. Squibb & Sons..3rd Cover
Winthrop Chemical Co.....vii

Colleges and Schools of Pharmacy

Buffalo.....—
Detroit.....ix
George Washington Univ.....ix
Massachusetts.....viii
New York.....—
Philadelphia.....ix
Pittsburgh.....—
St. Louis.....ix
University of Illinois.....—
University of Maryland.....ix

Drugs

J. L. Hopkins & Co.....ii

Fire Insurance

American Druggists' Fire Insurance Co.....x

Pharmaceuticals

Abbott Laboratories.....—
Armour Laboratories.....iii
Burroughs Wellcome & Co.....—
Ciba Company.....—
Fairchild Bros. & Foster.....2nd Cover
Hoffmann-La Roche, Inc.....—
Hynson, Westcott & Dunning, Inc.....2nd Cover
Johnson & Johnson.....—
Eli Lilly & Co.....v
Parke, Davis & Co...Back Cover
Sharp & Dohme.....iv
E. R. Squibb & Sons...3rd Cover
The Upjohn Company.....—
William R. Warner & Co.....i
Winthrop Chemical Co.....vii

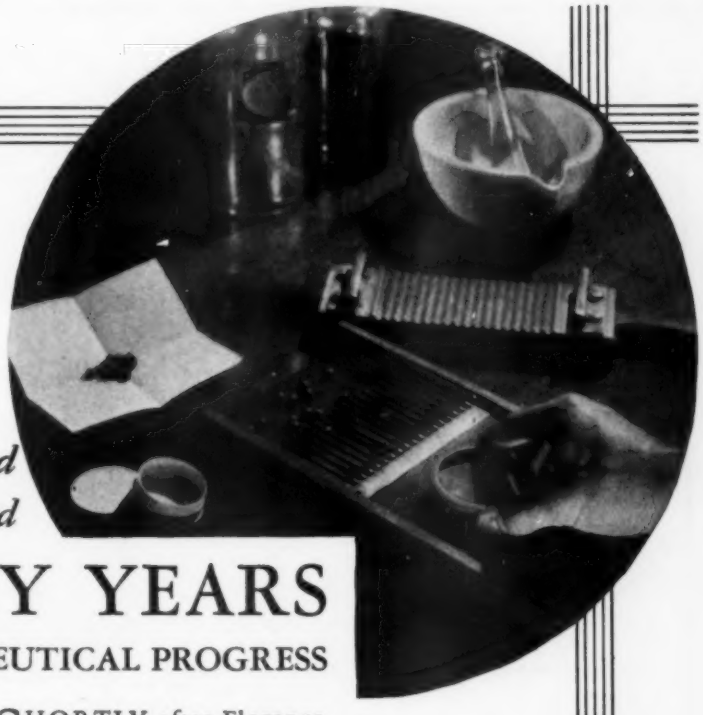
Pictures for Framing.....xviii

Scales and Balances

Henry Troemner.....viii
Torsion Balance Co.....ii

Want Ads.....ix

Mention the Journal of the A. Ph. A. when writing advertisers—It identifies you.



The sugar-coated Pills that started

EIGHTY YEARS

OF PHARMACEUTICAL PROGRESS

SHORTLY after Florence Nightingale became the heroine of the Crimean War, the apothecary, William R. Warner, looked out of his dispensary window and watched a candy maker at work across the street. From this observation, he formed the idea of giving pills a sugar coating. And before long he rolled the first batch of pills that were finished with a coating of sugar.

This progressive young druggist, in the course of time, enlarged his shop into a laboratory; for his skill as a manufacturing pharmacist brought many orders. Expansion continued, and today branch laboratories and agencies in 75 countries are evidence of 80 years of pharmaceutical progress.

The Warner policy allows the same discount, ratio of free goods and freight allowance, to the small retail pharmacy or the large chain or department store. Merchandise may be assorted as you please to make up one of four different size orders. Free goods selected at will from a list of over 3,000 items. There are no "inside terms" to anyone.

The Warner list includes Pharmaceuticals, Ethical Specialties, Household Remedies, Bulk Perfumes—the finest that science and the pharmaceutical skill of a great organization can produce.

William R. Warner, who, in 1856, laid the foundation for the great organization that was to bear his name and uphold his high ideals.

OMNIS ORBIS
WARNER
ESTABLISHED 1856

WILLIAM R. WARNER & CO., INC.

113 WEST 18th STREET
NEW YORK, N. Y.

•

404 SOUTH 4th STREET
ST. LOUIS, MO.

Branch Laboratories and Agencies in Seventy-five Foreign Countries

CRUDE DRUG SPECIALISTS

A precise understanding of the physical character and remedial usefulness of Crude Drugs is essential to their proper milling and preparation. Often, the remedial value of a finished product varies according to the skill exercised in milling the crude botanical drug.

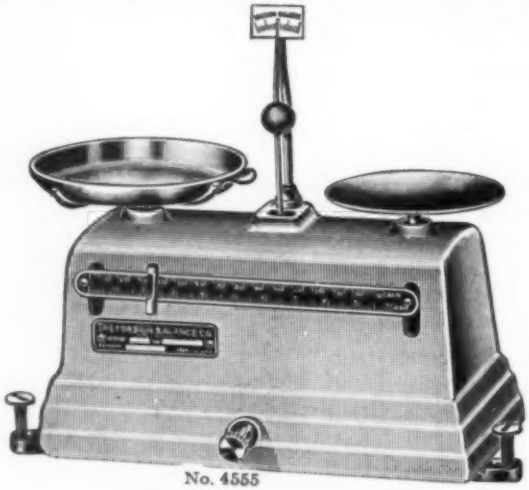
Because, for more than 40 years, we have exercised this understanding and had the complete equipment to apply it, "Hopkins Brand" Milled Crude Drugs represent the supreme achievement of specialized effort.

THE WORLD'S BEST DRUGS
OUR CHIEF ATTRACTION

Send for Complete PRICE LIST

J. L. HOPKINS & CO.

220 Broadway New York



No. 4555

Dispensing Scale

A Remarkably Rugged Scale for Dispensers, Ideal for General Pharmaceutical Work

White glazed case, sanitary and easily kept clean

Capacity 16 oz. Sensitive to ¼ grain. Removable pan 5 in. Graduated beam, 150 grains by 1 grain, and 10 grams by 1/10 gram. Price. . . $43.00

THE TORSION BALANCE CO.

Main Office: 92 Reade Street, New York City
Factory: 147-153 Eighth St., Jersey City, N. J.
Branch: 228 No. La Salle Street, Chicago
Branch: 576 Mission St., San Francisco

One of a series of advertisements on Mallinckrodt Chemicals as published in leading Medical Journals

Mallinckrodt

CHEMICAL WORKS

MAKERS OF FINE PRESCRIPTION CHEMICALS SINCE 1867

BROMIDES

RESUMÉ OF THERAPY

OSBORNE and Fishbein use bromides in whooping cough. . . . Rusby, for inducing sleep. . . . To quiet muscular restlessness (Clendening). . . . The literature cites bromides in nervous dyspepsia, diarrhea, infant colic flatulent, functional hypertension, asthma, dysmenorrhea, tetanus, etc.*

You can always assure yourself of Bromides of the utmost purity, stability and exact potency by specifying, on your prescriptions, M.C.W.—(Mallinckrodt). Mallinckrodt Sodium, Potassium and other Bromides are uniformly of exceptional quality—dissolving quickly and cleanly. Physical and chemical structure always standardized and laboratory controlled.

Your prescription pharmacist will dispense Mallinckrodt Bromides on your prescriptions if you indicate your preference by specifying M.C.W.

*A new brochure "Bromides—Resumé of Therapy" gathered from the latest clinical literature gives useful information on this valuable form of therapy. Send coupon for your copy.

MALLINCKRODT CHEMICAL WORKS

ST. LOUIS • PHILADELPHIA • NEW YORK • CHICAGO • MONTREAL • TORONTO

MALLINCKRODT CHEMICAL WORKS, ST. LOUIS, MO.

Please send me, without charge or obligation, your new booklet "Bromides—Resumé of Therapy."

.....M. D.

Address .....

City ..... *State* .....

Mention the Journal of the A. Ph. A. when writing advertisers—It identifies you.

Hexylresorcinol SUCRETS

Promptly Soothe Irritated Throats

TWENTY FOUR
HEXYLRESORCINOL SUCRETS
TESTED FOR GERMICIDAL ACTIVITY
A SUCRET dissolved slowly in the mouth produces a marked soothing effect on the irritated mucous surface of the mouth and throat.
Made in U.S.A.
SHARP & DOHME
PHILADELPHIA - BALTIMORE

THE season of throat irritation is here again!

Hexylresorcinol SUCRETS displayed in this attractive new counter stand are a "pick-up" item for every customer with an irritated throat condition. Dissolved slowly on the tongue, a Sucret produces a marked soothing effect on the mucous membrane of the mouth and throat . . . promptly allays that "scratchy" feeling.

Hexylresorcinol SUCRETS are convenient to carry. They are packed 24 in a neat metal box, every Sucret individually wrapped. They may be carried loose in the handbag or pocket, or kept at the bedside.

Every lot of Hexylresorcinol SUCRETS is standardized for germicidal activity by exacting bacteriological test.

Display SUCRETS in these attractive new metal stands . . . the stand comes free with an order of six dozen or more Hexylresorcinol SUCRETS. (Offer expires December 31.)

"For the Conservation of Life"

Pharmaceuticals - Mulford Biologicals

SHARP & DOHME

PHILADELPHIA *BALTIMORE*

TRADE MARK 'TABLOID' BRAND
SULFONAMIDE-P
0·5 gramme
(*p*-aminobenzenesulfonamide or sulfanilamide)

Administered by mouth in—Streptococcal Septicæmia, including Puerperal Septicæmia, Scarlet Fever with Complications, Erysipelas and Tonsillitis, Meningococcal, Gonococcal and Urinary infections

Also available as—
TRADE MARK 'WELLCOME' BRAND SULFONAMIDE-P
Bottles of 25 gm. *For Parenteral Use*

The Trade Marks 'TABLOID' and 'WELLCOME' denote specifically Burroughs Wellcome & Co. products

BURROUGHS WELLCOME & CO. (U.S.A.) INC.
9 & 11, EAST FORTY-FIRST STREET
NEW YORK CITY
Associated Houses:
LONDON MONTREAL SYDNEY CAPE TOWN
MILAN BOMBAY SHANGHAI BUENOS AIRES
E769 *All Rights Reserved*

Photographs Suitable for Framing

"Photograph of Headquarters, A. PH. A.," mat, $1.00.
"Ground Breaking for Headquarters Building," $1.00.
"Laboratory—A Misnamed Picture," $1.00.
"Dr. Frederick Power in His Laboratory," $1.00.
"Dr. William Withering," of Digitalis fame, $1.00.
"Post Cards, Exterior and Interior," set of 7, 25 cents.
"Code of Ethics, A. PH. A.," in two colors, enlarged for framing, 25 cents.
Sculptural Panels of AMERICAN INSTITUTE OF PHARMACY, about 11 by 15 inches; single, $1.00 each; when two are ordered at same time, $1.50 prepaid.
"Pharmaceutical Abstracts," unbound, no cover, 25 cents monthly; discount if five or more are ordered at same time.
JOURNAL A. PH. A., Back Numbers, unbound, per volume, $4.00. Bound volumes, per volume, $6.00.
May be obtained from AMERICAN PHARMACEUTICAL ASSOCIATION, 2215 Constitution Ave., Washington, D. C.

Journal, Volumes 1912–1937, inclusive; single copies, $0.35; Bound Annual Volumes	$6.00
National Formulary, Third Edition, cloth bound	$1.50
" " Fourth " " "	$3.50
" " Fifth " " "	$3.50
" " Sixth " " "	$5.00
Notes for the Physician, from N. F. VI (pamphlet); 1000, $14.00; 500, $7.50; 100,	$4.00
Notes for the Dentist, " " " " " ; 1000, $11.50; 500, $6.00; 100,	$1.25
Notes for the Dentist on Official Medication, from N. F. VI (pamphlet); 1000, $12.00; 500, 100, $1.35	$6.50
Pharmaceutical Recipe Book, I, cloth bound	$5.00
" " " II, " "	$5.00
Professional Pharmacy, First Edition	$0.25
" " Second Edition	$0.25
Prescription Ingredient Survey, issued in 1932, cloth	$2.00
Pharmaceutical Abstracts, Volume I (1935), cloth	$2.00
" " Volume II (1936), cloth	$2.00
" " Volume III (1937), cloth	$2.00
A New Nomenclature of Chemistry, Dr. Morveau, Lavoisier, Bertholett and Fourcroy. Translation by Lyman Spalding, 1796, paper cover. Photostatic Reproduction	$1.00
Proof Pages, U. S. Pharmacopœia (1820), facsimile reproduction bearing corrections by Elisha De Butts in script and a note from Dr. Lyman Spalding to Dr. De Butts, 40 pages, bound in heavy paper cover, $5^1/_2$ by 9 inches. Photostatic Reproduction	$3.00
Code of Ethics, A. PH. A., in two colors, enlarged for framing, 12 x 18	$0.25
Photographs.	
Headquarters, A. PH. A., mat	$1.00
Sculptural Panels (A. I. P.), mat, $1.00 each; two	$1.50
Post Cards, Exterior and Interior, A. PH. A. Headquarters, set of 7	$0.25
Reprints.	
"Reciprocity Explained"	$0.05
"Prerequisite Legislation"	$0.05
"A Pharmaceutical Study of *p*H," F. F. Johnson, paper cover	$0.25
"Report on Extent of Use of N. F. Galenicals," E. N. Gathercoal	$0.25

VALUES ARE UP!

DO YOU KNOW

WHETHER YOU HAVE ENOUGH FIRE INSURANCE?

BUSINESS PRUDENCE DEMANDS THAT YOU MAKE CERTAIN . . . MAKE CERTAIN THAT IT IS THE BEST OBTAINABLE, *CAPITAL STOCK* . . . THAT YOU DO NOT PAY TOO MUCH FOR THE REAL PROTECTION GIVEN NOR TOO LITTLE FOR SAFETY

OURS IS THE ONLY CAPITAL STOCK FIRE INSURANCE COMPANY WRITING EXCLUSIVELY ON THE PROPERTY OF RETAIL DRUGGISTS . . . AND WE MAKE FOR THEM A SUBSTANTIAL PREMIUM SAVING

SPECIALIST DRUG STORE LOSS ADJUSTERS

THE AMERICAN DRUGGISTS' FIRE INSURANCE COMPANY

American Building **Cincinnati, Ohio**

hemical
ibrary

JAN 25 1938

Happy and Prosperous New Year to All!

Vol. XXVI, No. 12 DECEMBER, 1937

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

TRADE MARK

CONTENTS

Frontispiece and Sketch—Charles Herbert LaWall 1223
Editorial:
Food and Drug Legislation 1225
The "Elixir of Sulfanilamide" Experience 1225
Scientific Section:
Solubility and Hydrogen-Ion Concentration of Quinine Salts. Part I—Johnson 1227
Solubility and Hydrogen-Ion Concentration of Quinine Salts. Part II—Johnson 1231
The Random Sampling Error as a Possible Answer to the Apparent Variations in Antiseptic Test Data—Cade 1233
An Improved Calomel Ointment—Vicher, Snyder and Gathercoal 1241
Drug Extraction. XIV. The Extraction of Podophyllum—Husa and Fehder 1246
A Comparative Study of Two Short Acting Barbituric Acid Derivatives—Swanson and Fry 1248
Solargentum Solutions—Stability on Aging—Van Deripe, Konnerth and Schoetzow 1249
Investigation of the Fruit of Sambuccus Calicarpa—Cook and Goodrich 1252
"Taxation Vertical *vs.* Horizontal"—Carstater 1256
Local Branches 1261
Societies and Colleges 1263
Obituary 1264
Editorial Notes 1265
Personal and News Items 1266
Index III
Pharmaceutical Abstracts and Index 489–630
Advertising—Cover Pages 2, 3 and 4 and pp. I–X.

Published Monthly by the American Pharmaceutical Association: Office of Publication, 20th & Northampton Sts., Easton, Pa. Editorial Office, 2215 Constitution Ave., Washington, D. C. Annual Subscription, $4.00; Canada, $4.35; Other Foreign, $4.50; Single Numbers, 35 cents; Canada, 40 cents; Other Foreign, 50 cents.

THE 86th ANNUAL MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION WILL BE HELD IN MINNEAPOLIS, MINN., Hotel Nicollet, August 22–27, 1938.

The 1938 Meetings of the American Association of Colleges of Pharmacy, the National Association of Boards of Pharmacy, Conference of Pharmaceutical Association Secretaries, of the Pharmaceutical Law Enforcement Officials and the Plant Science Seminar will also be held in Minneapolis, Minn.

Entered as second-class Matter, January 23, 1917, at the Post Office at Easton, Pa., under the act of March 3, 1879. Acceptance for mailing at a special rate of postage provided for in section 1103. Act of October 3, 1917; authorized July 10, 1918.

HOLADIN

An Extract of the Entire Pancreas Gland

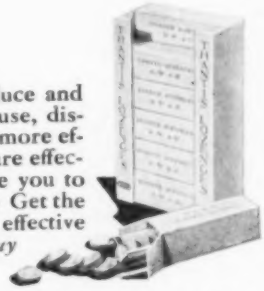
Holadin has long proved a definite resource in pancreatic disorders, diseases associated therewith. Holadin is put up in powder in 1 oz. and ½ oz. vials, no "directions;" as commonly prescribed, the pharmacist may readily attach the usual prescription label.

FAIRCHILD BROS. & FOSTER
New York

Holadin is also put up in capsules of 3 and 5 grains each.

PEOPLE nowadays don't travel by prairie-schooner—nor do they want out-of date remedies during the "Cold Season."

Thantis Lozenges H. W. & D.



relieve soreness and irritation of common throat affections, reduce and often prevent infection. • Thantis Lozenges are convenient in use, dissolve slowly, permit prolonged treatment of irritated areas, are more effective than gargles. • Physicians prescribe them because they are effective. • Recent price reductions provide greater profits—enable you to supply a scientific medically accepted product at moderate cost. • Get the good will and repeat business of customers by supplying an effective product. • *Thantis Lozenges, H. W. & D., are supplied in Display Boxes containing 12 cartons of 12 lozenges each.*

HYNSON, WESTCOTT & DUNNING, INC.
BALTIMORE, MARYLAND

THE SAME HIGH QUALITY IN STOCK PACKAGES

Merck
PRESCRIPTION
Chemicals

Whether you buy these fine chemicals in special amber glass bottles for open-view display, or in one pound lock-top canisters for your stock room shelves, the quality is always the same. Both types of containers offer definite advantages. They are scientifically designed to afford maximum protection; they are uniform in shape; practical and convenient for dispensing; and they give your prescription laboratory a modern, professional appearance which inspires confidence in your service.

. . . AND IN DISPLAY BOTTLES

MERCK & CO. INC. *Manufacturing Chemists* RAHWAY, N. J.

WE'RE TELLING PHYSICIANS

In Your Locality

Parke, Davis & Company's systematic and extensive program of promotion with physicians is nation-wide—and so carefully planned and carried out that it reaches the doctors in the smallest towns as well as those in the largest centers.

Supplementing and supporting thousands of personal interviews every day by our large medical service staff, our constant and varied campaigns-by-mail are designed as a definite factor for bringing business to your store from those physicians who practice in your immediate vicinity.

These promotional campaigns are timed to reach the physician at regular and frequent intervals. They keep the Parke-Davis name constantly in his mind—and they all mean business, profitable business, for stores which stock Parke-Davis Products and bring them to the attention of physicians in their home neighborhoods.

For Example

Among the Parke-Davis Products actively promoted to physicians at this time are

NATOLA	Haliver Oil fortified with Natural Vitamin D.
ABDOL *with* Vitamin C	Five essential vitamins of standardized high potency.
GLUCO-FEDRIN .	For palliative treatment of congestion of nose and throat in winter colds.
ANTUITRIN-S . .	The anterior pituitary-like sex hormone.
THEELIN	Estrogenic hormone in chemically pure form.

PARKE, DAVIS & COMPANY • *Detroit*

THE WORLD'S LARGEST MAKERS OF PHARMACEUTICAL AND BIOLOGICAL PRODUCTS